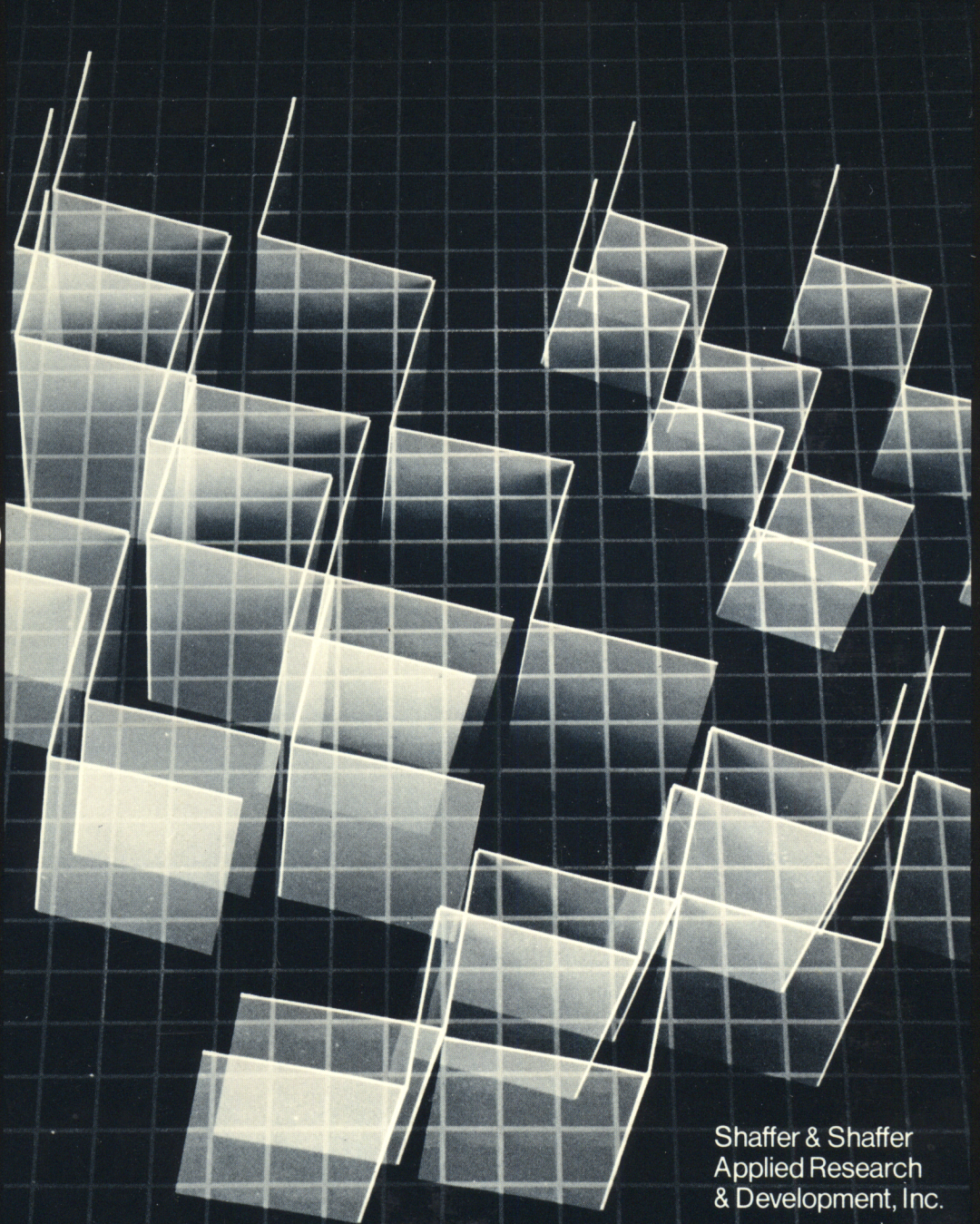


# VisiCalc<sup>®</sup> PROGRAMMING

NO EXPERIENCE NECESSARY

A Self-Instructional  
Fully Interactive Disk & Book



Shaffer & Shaffer  
Applied Research  
& Development, Inc.





# VisiCalc® Command Reference Chart

COMMAND	NAME	SUBCOMMAND	NAME
B	Blank		
C	Clear screen	Y	Yes
D	Delete	R C	Row Column
F	Format	D G I L R \$ *	Default General Integer Left justify Right justify Dollars & cents Graph
G	Global	C O R F	Column width Order of recalculation Recalculation mode Format
I	Insert	R C	Row Column
M	Move		
P	Print	P F	Printer File
R	Replicate	N R	No change Relative
S	Storage	L S I D Q #	Load from disk Store on disk Initialize disk Delete from disk Quit VisiCalc Load or store a DIF file
T	Titles	H V B N	Horizontal fixed titles Vertical fixed titles Both horizontal and vertical fixed titles None (unfixed titles)
V	Version		
W	Windows	H V 1 S U	Horizontal Vertical 1 window Synchronized scrolling Unsynchronized scrolling
-	repeating label		

## Helpful Hints

TO LOAD VISICALC (see pages 16–19 in this manual):

- turn the monitor and disk drive on (wait for disk drive light to go out)
- insert the VisiCalc diskette into Drive #1
- turn your Atari Home Computer on
- after a moment, the VisiCalc matrix will appear on your screen

IF VISICALC WON'T LOAD (see page 18):

- Is your equipment set up properly and turned on?
- Are you using the *VisiCalc* diskette?
- Did you insert the diskette with the label facing up and closest to you?
- Is the Drive Code of your disk drive set to 1?

TO LOAD A TUTORIAL CHECKPOINT (CP) FILE (see page 42):

- load VisiCalc (see above)
- remove VisiCalc diskette and insert Tutorial diskette provided with this manual
- type /SL
- type name of Checkpoint file (e.g., CP5) and press RETURN

IF A TUTORIAL CHECKPOINT FILE WON'T LOAD:

- Did you remove the VisiCalc diskette and insert the Tutorial diskette?
- Did you insert the Tutorial diskette with the label facing up and closest to you?
- Is the Tutorial diskette in Drive #1 with the disk drive door closed?
- Did you type in the correct file name?

TO TRY SOMETHING IN THE TUTORIAL OVER AGAIN:

- read the instructions at the bottom of the page you are working on (in the “if you are hopelessly lost” box)
- follow the typing instructions it gives you
- begin again at the top of the page indicated in this box

TO QUIT WORKING ON THE TUTORIAL AND TAKE A BREAK (see page 20):

- make a note of the page you are on
- remove any diskette(s) in the disk drive(s)
- turn your monitor, disk drive and Atari Home Computer off

TO PICK UP IN THE TUTORIAL WHERE YOU LEFT OFF (see page 20):

- load VisiCalc (see above)
- load *last* Checkpoint file you worked on
- read instructions at bottom of page you last worked on (in “if you are hopelessly lost” box)
- pick up again at the top of the page that this box refers you to

TO ERASE THE CONTENTS OF THE ENTIRE MATRIX (see page 49):

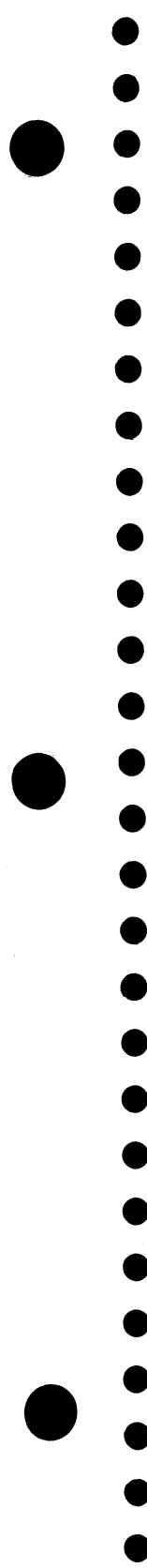
- type /CY

IF YOU ARE LOST IN THE MATRIX:

- type > A1 and press RETURN



VisiCalc® Programming  
No Experience Necessary





VisiCalc® Programming:  
No Experience Necessary

For the ATARI® 800™ and 1200XL™ Home Computers

Shaffer & Shaffer  
APPLIED RESEARCH & DEVELOPMENT, INC.



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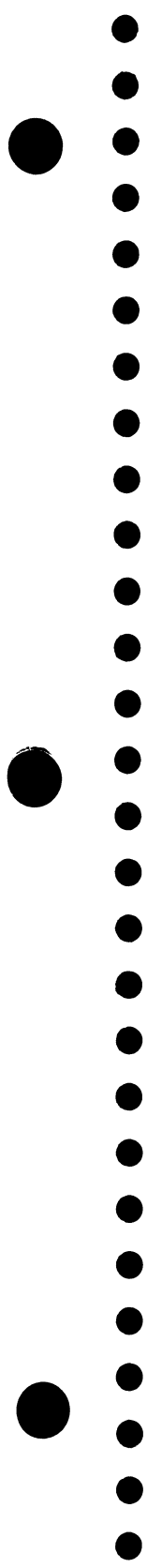
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Daniel N. Shaffer  
President  
Shaffer & Shaffer, Applied  
Research & Development, Inc.





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## PART I: INTRODUCTION

### Chapter 1: Introduction to VisiCalc®

You are about to learn how to use the most popular microcomputer program for business use -- VisiCalc. VisiCalc is an easy to use computer program for performing many types of calculations. Now you can replace tedious calculations performed with a calculator, pencil and paper. VisiCalc's powerful electronic worksheet, combined with your ATARI® computer's memory, allows you to make a variety of calculations automatically. Consider some of the tasks you can perform with VisiCalc:

- project sales and profit margins
- calculate income taxes
- develop detailed budgets
- value your financial portfolio

As you can see, VisiCalc is a versatile tool that can simplify much of your work.

It is important to emphasize that VisiCalc is not a canned financial system, such as accounts payable, payroll, or accounts receivable. Rather, it is a flexible structure which you can use for many different financial purposes. It is limited only by your own creativity. Once you become familiar with the basics, you'll be ready to expand your repertoire of Applications. Numerous Applications are presented later in this tutorial to whet your appetite.

VisiCalc has four key features:

1. a worksheet or matrix
2. a memory
3. Built-In Commands
4. Built-In Functions

Each key feature is described below.



VISICALC MATRIX. Visualize a huge sheet with thousands of boxes you can write in and easily erase. This sheet, the VisiCalc Matrix\*, is comprised of columns and rows. Intersecting lines of the columns and rows define boxes or Cells. The VisiCalc matrix contains 63 columns across the matrix labeled with letters (A to Z, AA to AZ, and BA to BK), and 254 rows down the side of the matrix labeled with numbers (1 to 254). There are over 16,000 cells in the VisiCalc matrix. Each cell is referred to using the intersecting point or Coordinate of the column and row (A1 to BK254). Coordinates are specified by column letter then row number (A5 is an example of a coordinate, whereas 5A would be incorrect).

As you might have guessed, your little screen cannot display the entire matrix at one time. It displays a part of the matrix through a Window consisting of 20 rows and several columns. The number of columns your screen holds depends on how wide you wish to make them. You can move this window as you like to view different parts of the matrix. Keypoint page 3 provides an illustration of the VisiCalc matrix as it will soon appear on your ATARI computer's Monitor.

VISICALC MEMORY. The VisiCalc Memory holds numbers, letters, formats and even formulas for each cell in the matrix. You can type these various entries into the cells using your computer keyboard. The first Character (number, letter, or symbol) you type into a cell determines whether that cell will hold a Value (number) or a Label (words). You can also put special Formats, such as dollars and cents, into each cell. Cells can be expanded to hold many characters or shrunk to hold only a few. Formulas which instruct VisiCalc to perform a calculation, such as adding a column of numbers or increasing all expenses by 15%, can be entered into cells. Once the characters which describe a value, label, or formula are entered into a cell, VisiCalc will hold them in its memory.

\* Each new term presented in the Introduction will be capitalized, underlined and defined on the companion Keypoint page.

# keypoint

A1	C
	21

A	B	C	D
---	---	---	---

1				
2				
3				
4				
5				

## NEW TERMS

CELL -- any one location (coordinate) on the VisiCalc spreadsheet

CHARACTER -- any symbol that can be typed and takes up one space in a cell

COORDINATE -- notation used to describe the physical location of cells  
(e.g., A1)

FORMAT -- determines where and how to display a value/label in a cell

FORMULA -- sequence of values (i.e., numbers/variables) and mathematical operators (e.g., +, -) which produce a resulting value(s)

LABEL -- any VisiCalc entry which is not intended to be treated as a value

MATRIX -- the table of rows and columns that make up the VisiCalc spreadsheet

MEMORY -- a location in the computer where programs (such as DOS and VisiCalc) and/or data are stored until they are replaced by new information or the computer is turned off

MONITOR -- a CRT (Cathode Ray Tube); looks like a TV

VALUE -- any VisiCalc entry which is treated as a formula, constant, or expression; not a label

WINDOW -- the portion of the VisiCalc matrix that is visible on the monitor

In fact, VisiCalc can hold three categories of information in its memory for each cell:

1. type of cell (value or label)
2. format which controls the display of its current contents
3. characters denoting the formula, value, or label

Keypoint page 5 shows an illustration of how the information each cell contains is displayed on your ATARI monitor. The information stored in memory for each cell can be easily changed by typing in new information.

Notice that there are three rows at the top of the illustrated screen in the Keypoint: A) Entry Contents Line, B) Prompt Line, and C) Edit Line. The top line, called Entry Contents Line, provides information about the cell where the cursor currently is located. The Cursor is a white box which indicates which cell you are in. In this case, the cursor is at A1. Once you have entered information into a cell, this Entry Contents Line will show all the information that has been entered (type of cell, format, characters). The second line, called Prompt Line, will encourage you to respond to VisiCalc's inquiries and keep you informed about what operations VisiCalc is performing. The number in the upper right-hand corner shows how much memory remains available to you. The bottom line, called Edit Line, displays each character as you type it. You will use this line to erase errors and make changes in what you have typed.

BUILT-IN COMMANDS (BIC). The most exciting feature of VisiCalc is its Built-In Commands. A Command is an order to VisiCalc you can activate by pressing a few keys. VisiCalc has 14 commands which allow you to generate, compute, format, store, and print a variety of calculated information. For example, suppose you wanted a detailed projection of expenses for next year. You might start by typing in some labels (rent, utilities, etc.). Then you could enter your estimates of what these expenses would be. The commands would allow you to perform operations such as the following:

# keypoint

## ILLUSTRATION OF SCREEN

A1 (V) 300	C	← (A)
File to Load	21	← (B)
CP3		← (C)

	A	B	C	D
(D) →				
1	300			
2				
3				
4				
5				

### NEW TERMS

- (A) ENTRY CONTENTS LINE - the first line in the white box at the top of the VisiCalc screen; shows location of cursor and contents of the cell at that location; also indicates Label (L) or Value (V)
- (B) PROMPT LINE - the second line in the white box at the top of the VisiCalc screen providing information about the status of the current location; also displays options offered on Built-In Commands and the remaining amount of memory available to the user (far right)
- (C) EDIT LINE - the black box immediately below the Prompt Line; displays new entries being typed (before pressing the RETURN key)
- (D) CURSOR - white box filling the cell currently being worked on; the cursor actually occupies the user's current position in the VisiCalc matrix
- COMMAND - a specified typed instruction to which VisiCalc responds with an action affecting some or all of the VisiCalc matrix

- repeat recurring expenses across 12 months
- add a row for an expense you forgot
- delete a row for an expense you paid off
- add titles to make your budget attractive
- recalculate all your expenses automatically if inflation got even worse

The Built-In Commands can take you all the way from a blank matrix to a printed financial report. Commands can be used to:

- build a Financial Model
- Store the model on a diskette
- Load the model from a diskette to add more data and make changes
- Print out the final results of the model for use in reports

You can use VisiCalc to work on many projects simultaneously simply by saving your work on diskettes.

**BUILT-IN FUNCTIONS.** The fourth key feature of VisiCalc is its Built-In Functions. A Function is a mathematical calculation that VisiCalc can perform automatically when you press a few keys. VisiCalc has 22 Built-In Functions. The functions range from simple to sophisticated. The simple functions will automatically:

- add a list of numbers
- choose the smallest number in a list
- choose the largest number in a list
- count the number of entries in a list
- calculate the average of a list of numbers

The more sophisticated functions allow you to use trigonometry and table lookups. You will be learning more about Built-In Functions later in this tutorial.

## TUTORIAL OBJECTIVES

This tutorial will teach you how to use VisiCalc quickly and easily. Technical concepts have been simplified, explanations have been streamlined, and numerous practical examples have been added so you can learn the basics.

Through this tutorial, you will learn how to do the following:

1. Describe the format and functions of the VisiCalc matrix.
2. Load VisiCalc into the microcomputer.
3. Find and use the most frequently used keys.
4. Erase your errors using various techniques.
5. Activate the most frequently used VisiCalc Built-In Commands.
6. Activate the most frequently used VisiCalc Built-In Functions.
7. Lay out a "Profit Analysis Model" by inserting labels, lines, and spaces in the matrix.
8. Insert numeric values into the model.
9. Generate and enter a mathematical formula.
10. Further develop a "Profit Analysis Model" by replicating numeric values, formats, and formulas.
11. Refine a "Profit Analysis Model" by changing the growth rate.
12. Practice improving the format of the model.
13. Perform "What If" analyses with your "Profit Analysis Model".
14. Practice using ready-made VisiCalc Applications to see advanced techniques in use.

## ORGANIZATION OF THE BOOK

This book is organized into three parts. In the first part, you will become comfortable with VisiCalc and using your computer to unmask VisiCalc's power. Next you will learn how to load VisiCalc into your computer so you can get started. Then, after a brief introduction to the keyboard, you will practice activating some of the most used commands. The first part closes with teaching you to activate the most used Built-In Functions.

The second part is a beginning tutorial. In this section you will build a Profit Analysis Model following step-by-step instructions. A Profit Analysis Model breaks down income and expenses then calculates profit. Various growth rates and expense levels can be projected and the model will automatically recalculate the profit margin. First, you will lay out the model and enter labels, values, and formulas. Next you will perform a variety of calculations using the Built-In Commands and Functions. Then, you will practice improving the model format. Finally, you will learn how to perform "What If" analyses, store, retrieve, and print out the model.

The third part is an advanced tutorial. You will practice using more sophisticated VisiCalc functions using a variety of Applications. The Applications are ready-made financial models that demonstrate advanced VisiCalc functions and other techniques. Keypoint page 9 summarizes the major parts of the book.

# keypoint

PART I INTRODUCTION	PART II BEGINNING TUTORIAL	PART III ADVANCED TUTORIAL
Learn how VisiCalc works. Get ready to use the tutorials. Become familiar with VisiCalc commands and functions.	Build a Profit Analysis Model following step-by-step instructions.	Practice advanced functions and techniques using a series of practical applications.

## NEW TERMS

APPLICATION -- a carefully constructed VisiCalc matrix that can display results for any number of cases dealing with a specific problem or question

FINANCIAL MODEL -- a model which calculates and/or projects a personal or corporate financial situation

FUNCTION -- a mathematical procedure available to the user via a simple command

LOAD -- to bring a computer program or data file into computer memory

PRINT -- creating a paper copy of as much of the VisiCalc matrix as desired

PROFIT ANALYSIS MODEL -- an example of a financial model constructed in Part II of the tutorial

STORE -- saving a computer program or data file on a diskette for future use



Sprinkled throughout this book are Keypoints, Checkpoints and Quizzes. Keypoints illustrate concepts and summarize the most important information. Checkpoints show you what your screen should look like at various points during the tutorial. Quizzes are designed to help you review and evaluate what you have learned. Anytime you miss a Quiz item, be sure to review the related readings and exercises in the previous section.

## SUMMARY

The introduction has provided an overview of the key features of VisiCalc. You have learned the following facts:

- VisiCalc is a versatile, easy to use computer program for performing many different financial operations.
- VisiCalc has four key features: 1) a matrix, 2) a memory, 3) Built-In Commands, and 4) Built-In Functions.
- The VisiCalc matrix is a huge worksheet of columns and rows forming cells you can write in and erase.
- The VisiCalc memory can hold information about the cells. The memory can hold three categories of information for each cell: 1) type of cell, 2) format for displaying current contents, and 3) characters denoting the value, label, or formula stored in the cell.
- The 14 Built-In Commands are orders to VisiCalc which you can activate by pressing a few keys.
- The 22 Built-In Functions are mathematical calculations that VisiCalc will perform automatically when you press a few keys.

You have been introduced to many new terms that will be used throughout this tutorial. It is important for you to become comfortable with these technical terms since these and more will be used throughout this tutorial. From now on, any capitalized and underlined term you find in the text, as well as those presented so far, will be defined in the Glossary on page 219. You are encouraged to use the Glossary frequently so that the technical language will not impede you from becoming a master of VisiCalc.

You have also learned that this book is organized into three sections: 1) Introduction, 2) Beginner's Tutorial, and 3) Advanced Tutorial. The objectives you will master in each section have been presented. At this point you are ready to start your journey into VisiCalc.

## Chapter 2: Getting Started

You are now ready to begin working with VisiCalc on your ATARI 800 computer. If you have not used microcomputers before, don't worry. Remember -- you can't hurt the ATARI or VisiCalc by anything you type. You can only make typing or logical Errors. Most errors can be easily repaired using one of VisiCalc's commands. The ATARI 800 will make a buzzing sound if it does not understand what you are trying to do. The ATARI 1200's beeps and buzzes come through the monitor's speaker instead of the computer itself. You can control their loudness by adjusting the volume on your monitor or TV.

Whenever you wish to work with this manual, you must: 1) Load VisiCalc into your computer, and 2) Insert the manual's tutorial diskette in the computer's disk drive. In this section, you will learn how.

## A FEW WORDS ABOUT DISKETTES

A diskette is a small magnetically coated plastic circle (like a small record) in a protective cardboard jacket. Each diskette you will use contains necessary information for using this tutorial to learn VisiCalc. A diskette should be handled carefully. Never touch the exposed magnetic surface with your fingers or any implement. Protect the diskette from dust by storing it in the paper sleeve it comes in.

You will first be inserting the ATARI 800's VisiCalc diskette, and then the tutorial diskette, into the computer. The one thing that can hurt a computer is to interrupt the loading process. Never open the disk drive door or turn off the power when the little red BUSY light near the disk drive door is on.

## A FEW WORDS ABOUT YOUR ATARI 800

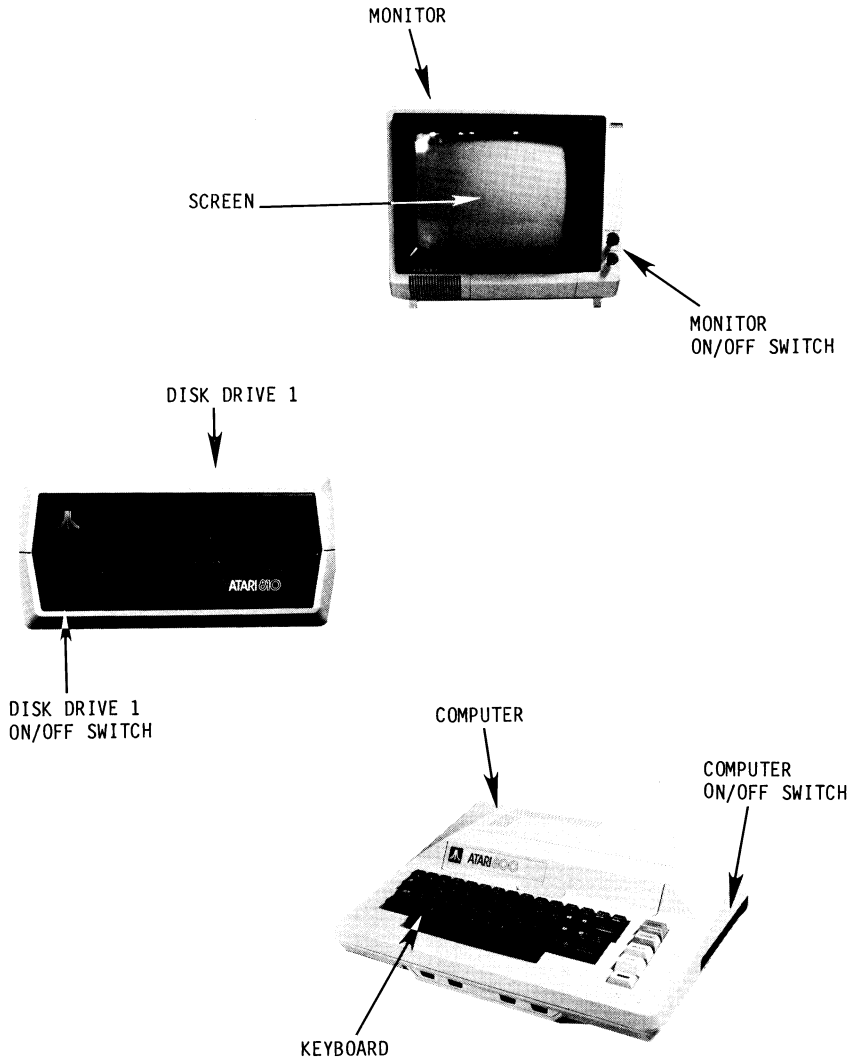
This manual assumes that you have a 10K ROM Operating System Module and a total of at least 32K RAM or Memory Modules. (Note: The ATARI 1200 comes with 64K of memory. If you are using a 1200, the rest of this paragraph does not apply to your machine.) Okay? Whether your computer is off or on, begin by removing any ATARI ROM cartridges from the left and right slots of the forward cartridge bay. VisiCalc will not load if either of these slots has a cartridge in it. If you want to check, insert your fingers into the latch at the top of the keyboard that says "PULL OPEN" and press down and towards yourself. The bay door will pop open. If there are cartridges in either slot, remove them and close the door. Your ATARI 800 should look like the picture on Keypoint page 15. Find the following:

- 1) The computer ON/OFF switch
- 2) The disk drive (called drive 1)
- 3) The disk drive ON/OFF switch
- 4) The screen (monitor) ON/OFF switch
- 5) The keyboard

Good. Now you can load the VisiCalc program into the memory of your computer. Doing this allows you to learn VisiCalc while the computer interacts with the VisiCalc program.

# keypoint

YOUR ATARI 800



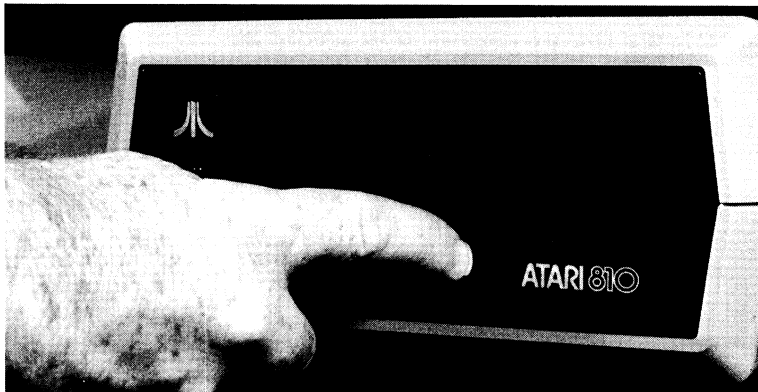
## LOAD VISICALC

To load VisiCalc into your computer, take the following steps:

- 1) Check your disk drive. Make sure that the BUSY light is not on, then open the door (by pressing in the button beneath the door) and remove any diskette that might be present. You can leave the door open.

Is the disk drive clear now? Good. Now you can load VisiCalc.

- 2) If your equipment is turned off, begin by turning on the monitor. Then locate the POWER switch at the front of the disk drive and turn it on. Both the PWR. ON and BUSY lights will come on and the drive motor will produce a whirring sound for about 6 seconds. When all is quiet again, only the power light will remain on.
- 3) Remove the VisiCalc program diskette from its paper sleeve. Holding the paper edge facing up and closest to you, insert it all the way into the disk drive. You will hear a faint click and the diskette will remain entirely inside the disk drive. If you let go and the diskette jumps out at you, re-insert it with a little more pressure. Close the drive door by pushing its handle down, until you hear the door click shut. (See the photographs on Keypoint page 17.)



GENTLY OPEN DOOR BY PRESSING IN THE BUTTON AT THE BOTTOM



SLIDE IN DISKETTE WITH LABEL FACING UP AND TOWARDS YOU  
UNTIL YOU HEAR A LITTLE CLICK



CLOSE DISK DRIVE DOOR UNTIL YOU HEAR IT CLICK



- 4). Now turn the computer on by pushing the power switch to the ON position. If your computer was already on, turn it off, wait a moment, and turn it back on. The switch is located on the right side of the computer, just past the 2-CHAN-3 switch. The ON/OFF switch on the ATARI 1200 is located on the left rear corner of the computer.

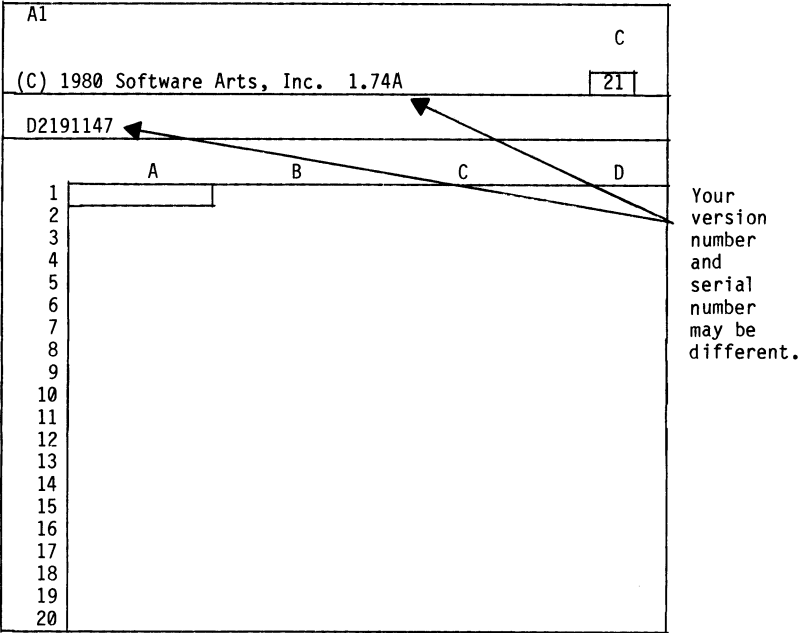
VisiCalc will begin loading immediately after the computer is turned on. The drive takes about half a minute to load VisiCalc into RAM memory.

NOTE: If you have trouble loading VisiCalc, make sure that the DRIVE CODE number of your disk drive is set to 1. VisiCalc will not load unless it is. Check the recessed switch at the rear of your disk drive and consult page 3 of your disk drive manual for details.

Notice the white box on your screen filling cell A1. This is the cursor. The cursor denotes the cell to be worked in. You can move the cursor to any cell on the matrix.

# checkpoint 1

PICTURE OF THE VISICALC SCREEN



## A NOTE ON THE CHECKPOINTS

The Checkpoints in the tutorial text allow you to check your progress throughout the tutorial with a printed page of what your screen should look like at different stages. The horizontal dashed lines have been inserted in the text to clearly separate each row and highlight the location of each cell in the matrix. These lines will not appear on your screen.

It is probable that you will not complete this tutorial at one sitting. If you need to leave us somewhere in the middle, simply open the disk drive door, remove the tutorial diskette and replace it in its paper sleeve. Turn off the computer and the monitor. When you return to VisiCalc, you must perform exactly the same steps to load VisiCalc. Then, to continue in this text, follow the instructions at the bottom of the page you last completed. You will be prompted to load the last Checkpoint you were working on -- it's that easy!

## SUMMARY

Look at your screen. It should look like Checkpoint 1 on page 19. The second line contains the copyright notice and version number of your VisiCalc. The third line contains a serial number unique to your particular diskette. The number 21 in the upper right corner is the memory indicator. It may be different on your screen, as this value is related to the amount of remaining memory of the ATARI 800 you are working with.

## COMING ATTRACTIONS

You have loaded VisiCalc. This is a significant accomplishment! You are now ready to learn one of the most exciting programs ever developed for personal computers. Have you noticed the diskette in the front of this manual? Turn the page to find out how it can help you learn VisiCalc quickly and easily.

## USING THE TUTORIAL DISKETTE

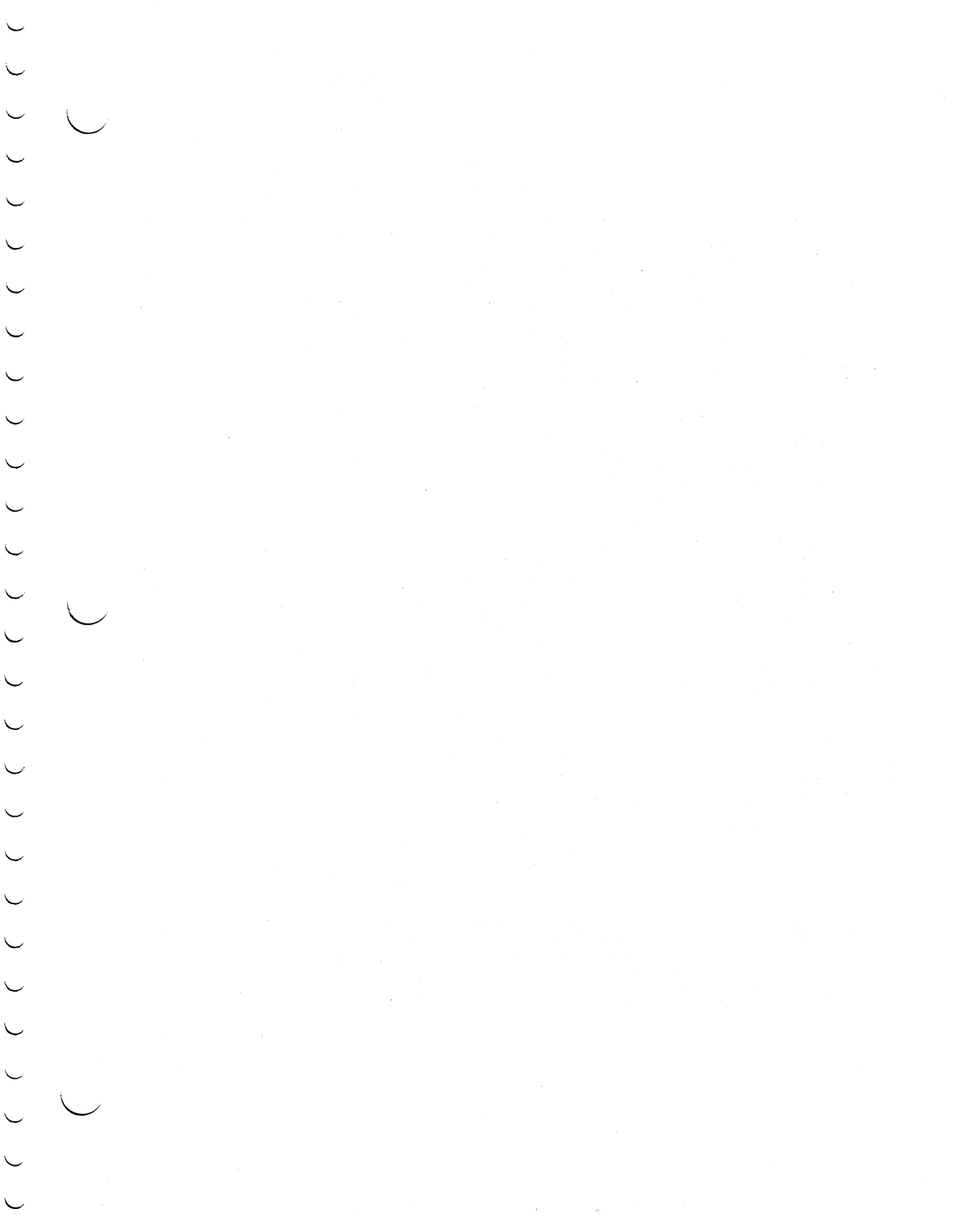
Remove the VisiCalc diskette from the disk drive and insert the tutorial diskette that is included in this manual (it is kept in the front pocket). Close the disk drive door.

The diskette contains three types of learning aids: (1) examples, (2) a financial model in various stages of construction, and (3) Applications. Examples illustrate the most used commands and functions of VisiCalc through simple financial models. The financial model stages show exactly how your ATARI monitor should look at each step of building a Profit Analysis Model. Applications are templates of complete, relatively sophisticated financial models that allow you to see some advanced VisiCalc techniques in action. Each of these aids is stored as a "Checkpoint" to be used in the learning process.

This tutorial diskette allows you to quickly see some of the capabilities of VisiCalc covered in Part I of this manual. Examples from the tutorial diskette will be loaded as learning Checkpoints into the VisiCalc matrix.

In Part II, you will use the tutorial diskette to build a Profit Analysis model step-by-step, re-do sections which you are unsure of, and see the correct form of the model at any step. This is accomplished by loading the correct stage of the model construction as a Checkpoint into the VisiCalc matrix.

In Part III you will use the tutorial diskette to load Applications as learning Checkpoints into the VisiCalc matrix. The Application models demonstrate the versatility of VisiCalc. You can try these once you have mastered the basics.



### Chapter 3: Touring the Keyboard

Starting with this page, the book is organized in an easy to follow, learn as you go format. Notice the two columns on the right side of this page. One column is labeled "with cursor at" and the second column is "take this action". "With cursor at" will tell you the location in the matrix on your screen where something should be entered. "Take this action" will tell you exactly what to type to perform each operation. Every action you will need to take on the microcomputer will be summarized step-by-step in these two columns.

The box at the bottom of each page contains instructions for going back to the last Checkpoint screen. For example, following the instructions at the bottom of this page will cause your screen to look like Checkpoint 1. Be sure to follow these instructions exactly.

A clarification of this tutorial's typing instructions is appropriate here. Many of the typing instructions in the text will appear at the end of a sentence or will be followed by an additional explanation enclosed in parentheses. Do not type the punctuation or additional instructions. An example is the first instruction in the next paragraph. "Type /." means type a slash (/) only, not the period. The same is true of any commas appearing in the "take this action" column of the text.

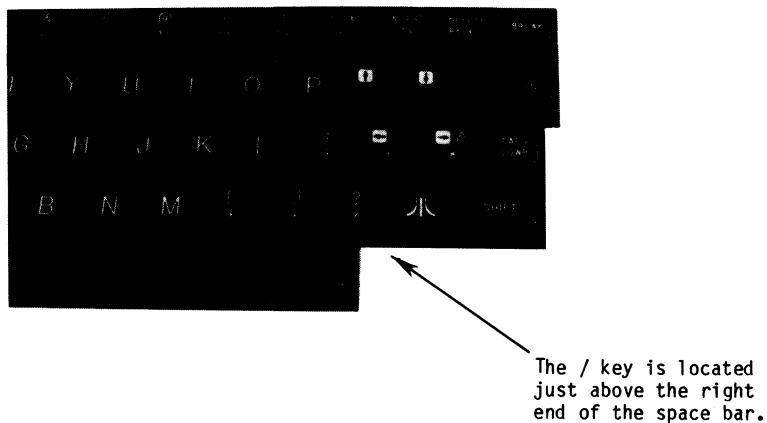
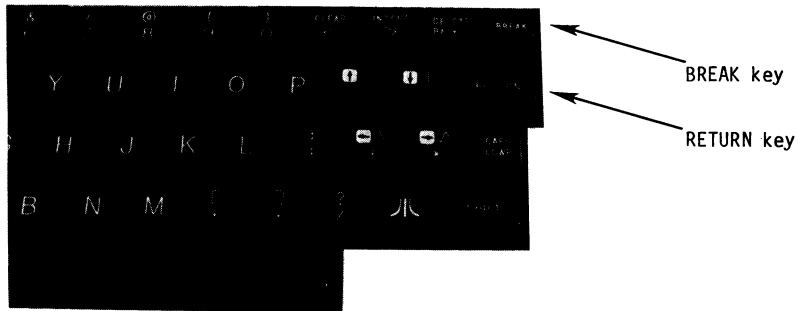
Now let's start to explore the capabilities and features of VisiCalc. You begin by loading into the VisiCalc matrix an example from your tutorial diskette. The cursor is at A1. Type /. The / key is located on the lower right-hand side of the keyboard. Look at the illustration on page 25 for its exact location. Slash (/) tells VisiCalc that the next character you type will be one of its Built-In Commands (BIC's). Notice that as soon as you press the / key, the words "Command: BCDGIMPRSTVW-" appear on the Prompt Line.

with cursor at	take this action
A1	type /

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

# keypoint





Each one of these letters stands for a Built-In Command. (We will cover most of these commands in this tutorial.) To try them out, turn the page.

Note: If at any time you make a typing mistake, use the BACKSPACE or the ESCAPE keys (see p. 27 for location on keyboard) to erase your error. If all else fails, press the BREAK key (p. 27) and begin typing again. If you are using the ATARI 1200, please notice that the BREAK key is the rightmost silver key at the top of the keyboard. Its function in VisiCalc is the same as the BREAK key on the 800.

with  
cursor  
at

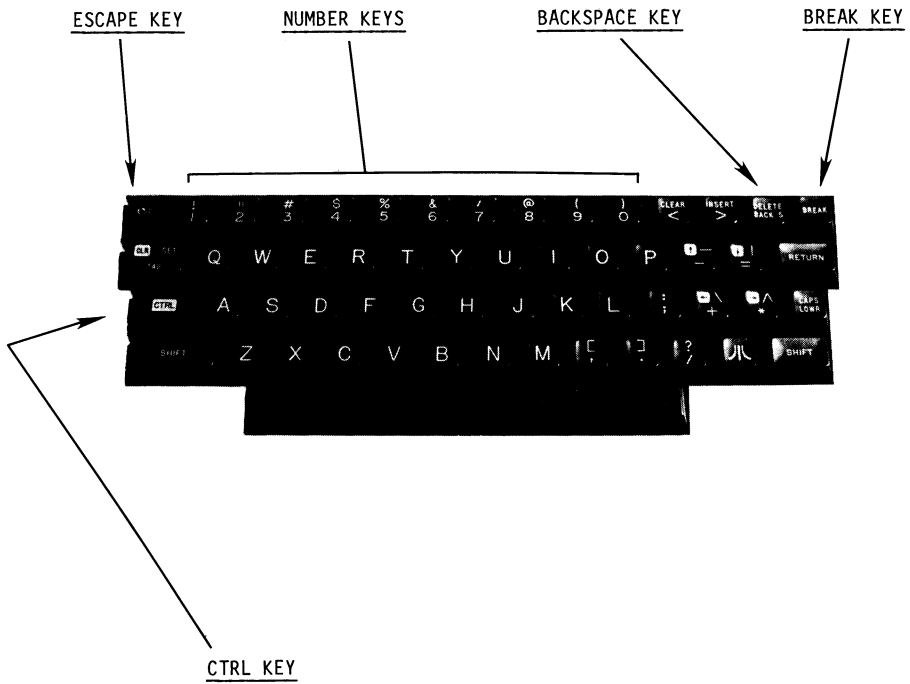
take this action

**If you are hopelessly lost:**

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 24

# keypoint

ATARI 800 KEYBOARD



Type S. Look at the Prompt Line.

S stands for the Storage Built-In Command and it will load previously saved VisiCalc models from a diskette.

Type L. Look at the Prompt Line.

VisiCalc is asking you for the name of the file to load into the VisiCalc matrix. Type CP2. The Edit Line should have CP2 in it. Don't worry whether your letters are upper or lower case.

Press the RETURN key located on the right-hand side of the keyboard. From now on in this book we will designate the RETURN key as **Ⓡ**. Look at Keypoint page 25 for the exact location of **Ⓡ**. The disk drive will make a whirring sound, the red BUSY light will come on briefly, and words will flash by on the Edit Line.

Your screen should look like page 29.

Congratulations, you are on your way to learning how to use VisiCalc. Study your screen. Notice that the words VALUES, FORMULAS, and LABELS appear on the example screen. As you recall, these are the three types of entries you will be making into the VisiCalc matrix to construct your own models. The cursor is at A15. By the way, have you noticed what's in the Entry Contents Line? It holds the formula +A10+A11+A12, which means to sum the contents of these three cells. Notice that each term is preceded by a plus sign (+). If you look at coordinate A15 you can see the formula worked. VisiCalc has added the values in cells A10, A11, and A12 together: 1000 + 2000 + 3000 = 6000. See, formulas are not so bad!

Next you will take a tour of the keyboard, learn how to enter values and labels, and see many VisiCalc features in action.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 24

with cursor at	take this action
A1	type S
A1	type L
A1	type CP2
A1	press <b>Ⓡ</b>

## checkpoint 2

A15 (V) +A10+A11+A12				C
				20
	A	B	C	D
1	COPYRIGHT	1983 BY	SHAFFER &	SHAFFER,
2				
3	CONGRATUL	ATIONS...	YOU HAVE	
4			SUCCESSFU	ULLY
5			LOADED AN	
6			EXAMPLE I	NTO
7			THE VISIC	ALC
8			MATRIX	
9	VALUES			
10	1000			
11	2000			
12	3000			
13				
14	FORMULAS			
15	6000			
16	LABELS			
17	-----			
18	INCOME			
19	EXPENSE			
20	PROFIT			

## ENTERING VALUES

Now load another example into your VisiCalc matrix.

Type /SL. Type CP3 and press the RETURN key.

Look at the screen and notice that the cursor is on position A10. Let's enter a value into this cell. Find the number keys which are located across the top of the keyboard. They are illustrated on Keypoint page 27.

Press the 1 key and quickly release it. Note that a 1 appears on the Edit Line. Now press the 1 key, hold it down and watch the 1 repeat to totally fill the Edit Line. Release the 1 key. This is a feature of the ATARI 800 that sometimes comes in handy. However, now we need to erase all those 1's.

Find the BREAK key. It is illustrated on Keypoint page 27. Press it. The BREAK key will make a buzzing sound when pressed. So don't worry, this is not an error. The Edit Line is now blank. The BREAK key can be pressed anytime to erase an entry and let you start again.

Type 1. While watching the Edit Line, press the BACKSPACE key (located next to the BREAK key). The small cursor on the Edit Line erased the number 1. Press the BACKSPACE key again. The Edit Line is now completely blank. You should use the BACKSPACE key to erase typing errors.

Now type 123456789. Find the ESCape key (ESC key) located in the upper left-hand corner of the keyboard. Press the ESC key. What happens? The cursor on the Edit Line erased one character. Press the ESC key again. Each time you press it, one character is erased. Notice that there is no difference between the function of the ESC and the BACKSPACE keys.

with cursor at	take this action
A15 A15 A15	type /SL type CP3 press <b>R</b>
A10  A10	press the 1 key and quickly release it press 1 and hold it down a second, then release it
A10	press BREAK key
A10  A10	type 1 press BACKSPACE  press BACKSPACE key
A10 A10  A10	type 123456789 press ESC  press ESC

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

# checkpoint 3

A10 (V) 1000	C
	20

A	B	C	D
---	---	---	---

1	COPYRIGHT	1983 BY	SHAFFER &	SHAFFER,
2				
3	CONGRATUL	ATIONS...	YOU HAVE	AGAIN
4			SUCCESSFU	LLY
5			LOADED AN	
6			EXAMPLE I	NTO
7			THE VISIC	ALC
8			MATRIX	
9	VALUES			
10	1000	<---ENTER	A VALUE	
11	2000			
12	3000			
13				
14	FORMULAS			
15	6000	<---WATCH	THIS VAL	UE CHANGE
16	LABELS			
17	-----			
18	INCOMF	<---FIX T	HIS LABEL	
19	EXPENSE			
20	PROFIT			

Now type the letter 0. What happens? Your computer beeped to signal that it couldn't accept the letter 0 as the number zero. Since an erroneous entry was attempted, the expression is erased by a single press of the ESC key. Try it. Now type 000 and press the RETURN key. Notice that zero's appear as 0 on the screen. Make sure you use the 0 on the keyboard when entering values into your VisiCalc matrix. Now blank the cell by typing /B. Press the RETURN key.

Type 1000. Note that the word "Value" appeared on the Prompt Line as soon as you began to type the value. Notice also that the value you typed appeared on the Edit Line but not in A10. This is because you have not yet entered the value (by pressing the RETURN key) which allows VisiCalc to process what you have typed.

Press (R). Notice that the Entry Contents Line fills out to display the Value indicator (V) and the actual expression you typed (1000).

Practice typing in and entering other values at A10 and watch the value change in the formula at A15. This illustrates the capability of VisiCalc to recalculate all the entries in the matrix when you change any entry.

After you finish practicing, type in 1000 and press (R). Your screen should look like the one on page 31. If it doesn't, follow the instructions at the bottom of this page.

Now let's learn to move around in the VisiCalc matrix. Look at the four arrow keys on the right side of your keyboard. Notice that each arrow points in a different direction. Now find the CTRL key at the left edge of the keyboard. The ATARI 1200's CTRL key is labeled CONTROL, and is in the same position on the keyboard. The functions of these two keys are identical.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 30

with cursor at	take this action
A10	type 0
A10	press ESC
A10	type 000 press (R)
A10	type /B press (R)
A10	type 1000
A10	press (R)
A10	type 1000 press (R)

## INDIRECT CURSOR MOVEMENT

Press the CTRL key and hold it. Now find the down arrow key (next to the RETURN key). While watching the screen, press the down arrow key. Release both keys. Remember to hold the CTRL key down until you have pressed the arrow key. The cursor should have moved down to cell A11. If your ATARI buzzed instead, you probably weren't holding down the CTRL key when you pressed the arrow key. Try again until the cursor is at A11.

If you are using the ATARI 1200, cursor movement can become even easier. The silver function keys (F1, F2, F3, and F4) allow you to move the cursor by pressing only one key. The F1 key moves the cursor up, F2 down, F3 right, and F4 left. Now you can use indirect cursor movement in two ways.

Now hold down the CTRL key and press the right arrow key. What happened? The cursor moved to the right. Now use the up arrow and left arrow keys to move the cursor back to A10. This is a handy way to move around on the screen and is called Indirect Cursor Movement. If you use an arrow key to move the cursor below row 20, or to the right of column D, you will see the worksheet "move" up, or to the left. This is referred to as Scrolling; using indirect cursor movement to move the cursor outside of the window it is in. You should try this by moving the cursor down to A22. Then, move the cursor back up to A10. If you continue holding any arrow key, the worksheet will continue to scroll until you release the key or reach an edge of the matrix.

### If you are hopelessly lost:

press BREAK key to clear the Prompt Line  
type /CY to clear screen  
continue from the top of page 30

with cursor at	take this action
A10	press CTRL key and hold it while pressing down arrow key once
A11	hold CTRL key and press right arrow key
B11	press up arrow key and then left arrow key



## DIRECT CURSOR MOVEMENT

Using the arrow keys, as you just learned, is the indirect method and is usually used for short distances. Now learn Direct Cursor Movement by doing the following. You need to move the cursor to A18 to correct the misspelled label in that cell.

Locate the key with the ">" sign. It is just to the left of the BACKSPACE key. (See the illustration on page 35.) Press the > key once. The Prompt Line on your screen displays a prompt message asking for a coordinate to move the cursor to. Type A18. Press (R). The cursor instantly moves to A18.

From now on the text will just say where to move the cursor when you need to move it. You can use either indirect or direct cursor movement to get there.

## ENTERING LABELS

To practice typing labels, take the following steps. First, look at the Entry Contents Line on your screen. It tells you that the contents of cell A18 is a (L)abel of INCOMF. Labels are used in VisiCalc to annotate calculated values, put messages on the screen, and generally to make the calculations (values displayed) more understandable. Type INCOME. Press (R).

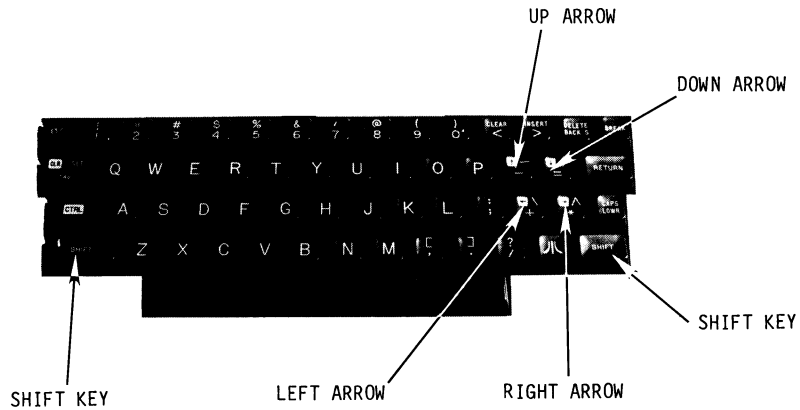
with cursor at	take this action
A10	press >
A10	type A18 press (R)
A18	type INCOME press (R)

### If you are hopelessly lost:

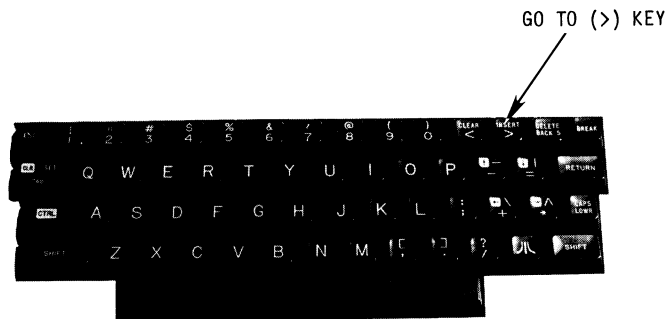
press BREAK key to clear the Prompt Line  
type /CY to clear screen  
continue from the top of page 30

# keypoint

## INDIRECT CURSOR MOVEMENT



## DIRECT CURSOR MOVEMENT



Is your label in lower case? If so, hold the SHIFT key and press and release the CAPS LOWR key located on the lower right part of the keyboard. Type INCOME. Press (R). What happened? The CAPS LOWR switches the keys from lower to upper case when you are holding the SHIFT key, and from upper to lower case when you press it by itself.

The ATARI 1200's CAPS LOWR key is labeled CAPS, and acts as a toggle switch. Press CAPS once and all characters are upper case. Press is again, and all characters are lower case.

## REVIEW

You have already learned a lot about your keyboard, how to enter values and labels and how to correct your entry mistakes.

Correcting Errors. A summary of which keys to use for different types of errors is presented below:

<u>Type of Error</u>	<u>How to Correct</u>
Typed the wrong character but have not pressed (R).	Use either the BACK-SPACE or the ESC key.
Typed several wrong characters and want to erase the entire Edit Line. Have not pressed (R).	Use the BREAK key.

Try the Quiz on page 37. It will help you review what you've just learned. When you're ready to see the powerful VisiCalc commands in action, type /CY to clear the screen.

## If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 30

with  
cursor  
at

A18

A18

A18

## take this action

hold the SHIFT key  
press and release  
CAPS LOWR key  
type INCOME  
press (R)

type /CY

# QUIZ ONE - True/False

1. An intersection of a row and column on the VisiCalc matrix is called a cell.
2. The white rectangular box that fills a cell on the matrix is called a cursor.
3. Coordinates establish a cell location within the matrix. An example of a cell's coordinates might be 5B.
4. The line located upper-most on your screen, which displays the current contents of a cell, is called the Edit Line.
5. The Prompt Line is used to display commands available, and various other inquiries by VisiCalc.
6. As entries of values, labels, or formulas are made, they appear on the Edit Line.
7. The RETURN key (Ⓜ) is used to complete an entry.
8. The / (slash) key is used to cancel an entry.
9. To erase a character before the RETURN key is pressed, you may use either the ESC key or BACKSPACE key.
10. To erase an entry entirely before the RETURN key is pressed, press the BREAK key.
11. Holding a key down for an extended period will cause an ERROR entry.
12. To move the cursor the "direct" method, type the words "GO TO" and then enter the desired cell coordinates.
13. To type capital letters, press the SHIFT key and the CAPS LOWR key.

Turn the page upside down to view the solutions.

1. T, 2. T, 3. F, 4. F, 5. T, 6. T, 7. T, 8. F, 9. T, 10. F, 11. F, 12. F, 13. T

Chapter 4: The Most Used VisiCalc Commands

Earlier you caused VisiCalc to display its Built-In Commands (BIC's) by pressing the / key. Let's do this again and start to learn a little more about the BIC's. Type /. Look at the screen. Notice that the Prompt Line contains the message "Command BCDFGIMPRSTVW-". Each of the individual letters stands for a different BIC. You will now activate each one to see what they do. Later in this section you will learn more about the most used commands. Now let's take a tour of all the commands to learn what operations each one performs.

THE COMMAND TOUR

Type B. The Prompt Line says "Blank". The Blank command allows you to Blank out the contents of a VisiCalc cell. Press the BREAK key. The screen is now cleared again.

Type /C. Look at the Prompt Line. The Prompt Line asks for a Y to complete this command. Type Y. You have used this Clear command already. It clears the entire VisiCalc matrix.

Type /D. The D stands for Delete. This command allows you to delete R(ows) or C(olumns) from the VisiCalc matrix. Press BREAK.

Type /F. Look at the Prompt Line. The F stands for Format and allows you to: justify labels to the L(eft) or R(ight), display numbers as \$ (dollars and cents), and other options for displaying the contents of VisiCalc matrix cells. Press BREAK.

with cursor at	take this action
A1	type /
A1	type B
A1	press BREAK
A1	type /C
A1	type Y
A1	type /D
A1	press BREAK
A1	type /F
A1	press BREAK

If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

Type /G. The G stands for Global and allows you to change the C(olumn) width, the O(rder) of calculations, whether R(ecalculations) are automatic or not, and the F(ormat) of all the cells in the matrix. Press BREAK.

Type /I. The I stands for Insert and allows you to insert a R(ow) or C(olumn) between existing rows and columns of your model in the VisiCalc matrix. This is really handy if you suddenly remember a new calculation you need to do after you're ninety percent of the way through entering your data. Press BREAK.

Type /M. Look at the Prompt Line. The M stands for Move and allows you to move parts of your model from one location to other locations in the VisiCalc matrix. Press BREAK.

Type /P. Look at the Prompt Line. The P stands for Print and allows you to print the contents of your model from the matrix to a P(rinter) or a F(ile) on your personal computer's diskette. Press BREAK.

Type /R. Look at the Prompt Line. The R stands for Replicate and this powerful command allows you to repeat portions of your model in other locations of the VisiCalc matrix. You will learn much more about this command later. For now press BREAK to look at another command.

Type /S. Look at the Prompt Line. The S stands for Storage and allows you to L(oad) and S(tore) the contents of your model in the VisiCalc matrix to and from a diskette. You can also D(elete) models, I(nitalize) a new data diskette to do other tasks on your computer, Q(uit) the VisiCalc system, or # (save the calculated numbers) for use in other models and programs. You have already used this command to load examples from your tutorial diskette into the VisiCalc matrix. You will use it again soon to view some other examples which illustrate the features of VisiCalc for you. Press BREAK.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 38

with cursor at	take this action
A1	type /G
A1	press BREAK
A1	type /I
A1	press BREAK
A1	type /M
A1	press BREAK
A1	type /P
A1	press BREAK
A1	type /R
A1	press BREAK
A1	type /S
A1	press BREAK

Type /T. Look at the Prompt Line. The T stands for Titles and allows you to keep one section of your VisiCalc matrix fixed while other parts of the model are brought into view. Usually the fixed part is a H(orizontal), V(ertical), or L-shaped section made up of B(oth) horizontal and vertical sections. Of course, sometimes you want N(o) title sections at all. Don't worry, this may sound confusing but you will get a chance to learn more about the Title command in Part II of this manual. Press BREAK.

Type /V. Look at the Prompt Line. It is showing you what V(ersion) of VisiCalc you have. Press BREAK.

Type /W. The W stands for Window, which is the visible portion of your VisiCalc matrix (i.e., what you see on the screen). The Prompt Line shows: "Window: H V 1 S U". The screen can be split into two windows, and these options allow you to specify where and in what direction you would like to split the screen, or if you would like to restore a 2-window screen back to 1 window. Press BREAK.

Type /-. The - key is the same as the up arrow key without holding down the CTRL key. The - stands for the Repeating Labels BIC. Try it. Type A. Press the (R) key. Look what happened in cell A1 of the matrix. VisiCalc repeated a series of A's to fill up the cell. This is handy for drawing lines ----- or borders \*\*\*\*\* in your model. Type /B. Press (R).

Type /. Look at the Prompt Line. Do you remember what the letters stand for? What does B stand for? What about S? Go through each letter to see if you can remember what it stands for. To review this section, follow the instructions at the bottom of this page. If you're ready to go on, press BREAK.

with cursor at	take this action
A1	type /T
A1	press BREAK
A1	type /V
A1	press BREAK
A1	type /W
A1	press BREAK
A1	type /-
A1	type A press (R)
A1	type /B press (R)
A1	type /
A1	press BREAK

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 38

# keypoint

## TABLE OF COMMANDS

/B	Blank	
/C	Clear	
/D	Delete	[Options: R(ow), C(olumn)]
/F	Format	[Options: D(efault), G(eneral), I(nTEGER), L(eft-justified), R(ight-justified), \$(dollars and cents), *(graph)]
/G	Global	[Options: C(olumn), O(rder), R(evaluation), and F(ormat -- see Format command)]
/I	Insert	[Options: R(ow), C(olumn)]
/M	Move	
/P	Print	[Options: P(rinter), F(ile)]
/R	Replicate	
/S	Storage	[Options: L(oad), S(ave), I(nitialize), D(etele), Q(uit), #{load or store a DIF file}]
/T	Titles	[Options: H(orizontal), V(ertical), B(oth), N(one or neither)]
/V	Version	
/W	Windows	[Options: H(orizontal), V(ertical), l(one win- dow), S(ynchronized), U(nsynchro- nized)]
/-	Repeating Label	



Chapter 5: Seeing the Most Used Commands in Action

Now you will load an example VisiCalc model to practice some of the commands. (Make sure your tutorial diskette is in your computer.)

Type /SL. Now type CP4 and look at the screen. Press (R). Remember /S is the Storage command. L tells the computer to load an example. In this case, CP4 (Checkpoint 4) is the example stored on the diskette to be loaded. Your screen should look like page 43.

The example is a Sales Report model which compares last year to the current year's sales in several sales regions. It calculates total sales and tells some additional information about the overall sales picture. You are going to use this example model to try out the most used VisiCalc commands. Turn the page to begin.

with  
cursor  
at

take this action

A1  
A1

type /SLCP4  
press (R)

**If you are hopelessly lost:**

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

# checkpoint 4

A12	(L) MEXICO	FORD	C
			20

	A	B	C
1			
2	SALES	REPORT	
3			
4		LAST YEAR	CURRENT
5	SALES AREA	\$ AMOUNT	\$ AMOUNT
6	-----	-----	-----
7	NORTHEAST	100.00	200.00
8	EAST COAST	300.00	
9	SOUTHEAST	500.00	600.00
10	MIDWEST	400.00	500.00
11	SOUTHWEST	700.00	300.00
12	MEXICO		500.00
13	WEST COAST	100.00	200.00
14	-----	-----	-----
15	TOTAL	2100.00	2300.00
16	=====	=====	=====
17	REGIONS	6	6
18	W/SALES		
19			
20	HIGHEST	700.00	600.00

## PRACTICE THE INSERT COMMAND

First, let's practice the Insert command to insert a row. Suppose that a new sales region has been added and you want to insert a row above MEXICO to add a new region. Your cursor is already in the right spot -- row 12. Type `/I`. Look at the Prompt Line. The Insert command is asking if you want to insert a R(ow) or C(olumn). When a row is selected, a new one will appear directly above the cursor. When a column is selected, a new column will appear directly to the left of the cursor.

Type `R` to insert a row. Look at your screen. VisiCalc has obeyed your command and made a space for your new sales region.

Type in the label CANADA. Press `(R)`.

Now let's put in a value for the current year's sales.

Move the cursor to C12 (Need some help? Type `>` and the Prompt Line will say "Go to: Coordinate". Type C12. Press `(R)`. You have moved the cursor to this location to enter current amount of sales). Notice that the total sales amount for the company is 2300 dollars (cell C16).

Type 400. Look at cell C16 as you press `(R)`.

Look what happened to the total current year sales amount. It changed to 2700 dollars to reflect the change you just made. This again illustrates VisiCalc's recalculation feature. It automatically recalculates every cell after any change is made.

You will learn more about the Insert command later. However, to try out this Insert command again, follow the instructions at the bottom of this page. When ready, look at the next command.

with cursor at	take this action
A12	type <code>/I</code>
A12	type <code>R</code>
A12	type CANADA press <code>(R)</code>
A12 A12 A12	type <code>&gt;</code> type C12 press <code>(R)</code>
C12	type 400 press <code>(R)</code>

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type `/CY` to clear the screen  
continue from the top of page 42

## PRACTICE THE DELETE COMMAND

The companion of the Insert command you just learned is the Delete command.

Delete the row you added for the Canadian sales region. Type /D. The Delete command is asking if you want to delete a R(ow) or C(olumn).

Type R while watching the screen. VisiCalc has obeyed your command and deleted the row. It also moved up the rows below the deleted one so that all evidence of the Canadian sales region has been removed.

You have now seen the /I and /D commands in action. To try out these commands again, use the instruction at the bottom of this page.

Now to see how the powerful Global command works, move the cursor to A12.

Note: At times in this tutorial, you will be instructed to press a key activating a command while watching the screen. Be careful not to hold this key down too long or you may end up with repetitive characters on the screen wherever the cursor rests. If this happens, just use the BACK-SPACE or ESC key to erase the unwanted characters.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 42

with  
cursor  
at

take this action

C12

type /D

C12

type R

C12

type >A12  
press Ⓜ

## PRACTICE ACTIVATING THE GLOBAL COMMAND

Use the Global command to change the way this example model is displayed. Look at the Entry Contents Line. Notice that the label MEXICO FORD is in the cell. Now look at cell A12. Only the word MEXICO is displayed. Curious! The reason for this is that the display column width in this example has been set to only 10 characters. To see the names of the regional managers (as FORD is the regional sales manager in MEXICO), use the Global command. Type /G. Look at the Prompt Line. The Global command is asking you whether you want to change the C(olumn) width, the O(rder) of calculation process, the R(ecalculation) timing, or the F(ormats) in the matrix. Which do you want? Type C. Look at the Prompt Line.

Type 18. Press (R). What happened on your screen?

You can now see all the regional manager's names because you expanded the display column width to 18 characters. Change it back to 10 characters. Do you know how? Type /GC10. Press (R). Look at your screen. It should look like page 43.

Again practice another use of the Global command. Type /G. Use the F(ormat) subcommand to make the screen less cluttered. Type F. VisiCalc now displays a list of formats for you to select from. The format I stands for Integer. You can use it to remove the cents from the sales amount information.

While watching the screen, type I. What happened? VisiCalc Globally re-formatted all the numeric values displayed to show only their integer portions.

with cursor at	take this action
A12	type /G
A12	type C
A12	type 18 press (R)
A12	type /GC10 press (R)
A12 A12	type /G type F
A12	type I

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP4 (R)  
continue at the top of this page

Now use the Global command to format the display to show the cents again. Do you know how? Type /GF\$ (remember to hold down the SHIFT key when typing the \$/4 key). Look at the screen. The cents should again be displayed. Your screen should again look just like page 43.


The Global subcommand O(rder of calculations) is closely related to the "C" that has always appeared in the upper right-hand corner of your screen. This indicates that the calculations VisiCalc performs will be done in C(olumn) order. That means, whenever VisiCalc recalculates the values of each cell in the matrix, it begins in column A, at cell A1. It then proceeds recalculating down column A until it reaches row 254. Column B is then recalculated in the same way, as VisiCalc proceeds through the entire matrix until reaching the final column of BK.

The alternative to column order recalculating is row order recalculating. In this case, VisiCalc recalculates each row left to right, starting at row 1, until reaching row 254. If you specify R(ow) using the Global Order subcommand, an "R" will appear in the upper right-hand corner of your screen. The order of recalculation may become significant when you design your own models.

To practice using the Global command again, follow the instructions at the bottom of this page. You have now used the Insert, Delete, and Global commands. To learn some more about the amazing flexibility of VisiCalc, continue to the next page to see the Format command at work.

with cursor at	take this action
A12	type /GF\$

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP4   
 continue from the top of page 46

## PRACTICE ACTIVATING THE FORMAT COMMAND

The Format command allows you to format a particular cell to a variety of display formats. The options for formats are the same as those in the Format subcommand of the Global command you have already tried.

Move your cursor to B2 (showing the label "REPORT") to practice the formats available for labels.

Type /F. Look at the Prompt Line. You have a list of formats to pick from. Typing "L" Left-justifies (pushes the label) to the left of the cell. Typing "R" Right-justifies to the right of the cell. Look at the Entry Contents Line. This label is correctly left-justified.

Type R. What happened? The label REPORT jumped to the right of the cell.

Type /FL while watching the screen. What happened? The REPORT label jumped back to the left. This command makes it easier for you to line up labels in your models to look the way you want them.

To try out the Format command again, follow the instructions at the bottom of this page. When you are ready, go to page 49 to practice the Clear command.

with cursor at	take this action
A12	type >B2 press Ⓡ
B2	type /F
B2	type R
B2	type /FL

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP4 Ⓡ  
continue from the top of page 46

PRACTICE ACTIVATING THE CLEAR COMMAND

Are you tired of looking at this example?  
Let's make it disappear.

Type /C. Look at the Prompt Line.

VisiCalc is giving you a chance to consider what you are about to do! The Clear command removes everything from all the cells of the VisiCalc matrix and returns you to exactly the same place as you were just after you loaded the VisiCalc disk.

Type Y. Poof!

All this power may go to your head! To try this again, follow the instructions at the bottom of this page.

with  
cursor  
at

take this action

B2

type /C

B2

type Y

**If you are hopelessly lost:**

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP4 ®  
continue at the top of this page



## PRACTICE ACTIVATING THE REPLICATE COMMAND

The Replicate command is the most powerful command VisiCalc has to offer you.

Most of the second part of this manual is concerned with teaching you this command. What you are going to do here is an exercise to demonstrate some of R(ePLICATE)'s features. Your screen should be clear. To make sure, type /CY.

Type EXERCISE. It doesn't matter whether it's upper or lower case (see page 36). Press **R**.

Type /R. Look at the Prompt Line. It is asking you to either give it a "Source range" or press the RETURN key. You will learn to specify a Source range in a moment. For now, press **R**. Look at the Edit Line. It says "A1...A1:". This means that Replicate is going to copy whatever is in location A1 to somewhere else. Where? Well, look at the Prompt Line. VisiCalc now wants a "Target range". The "Target" is the location in the VisiCalc matrix where you would like to see a copy of the contents of cell A1. Let's put it in A2. Type A2 and press **R**. Remember, you can use the ESC key to "back out" of errors.

Look at the screen! You have replicated (or copied) the label "EXERCISE" into cell A2. Your screen should now look like page 51.

with cursor at	take this action
A1	type /CY
A1	type EXERCISE press <b>R</b>
A1	type /R
A1	press <b>R</b>
A1	type A2 press <b>R</b>

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

checkpoint 5

A1 (L) EXERCISE		C		
		20		
A		B	C	D
1	EXERCISE			
2	EXERCISE			
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Let's see more!

Type /R. Press the period (.) key. Look at the Edit Line.

VisiCalc has produced three periods and is waiting for you to enter something else.

Type A2. Guess what? You have just specified a "Source range". "Source" refers to the cell or cells on the VisiCalc matrix that you want to copy somewhere else on the matrix. "Range" refers to describing the series of cells in the source location by specifying a beginning cell (one end of the range) and an ending cell (the other end). See the diagram on page 53. You specified a source range starting at A1 and ending at A2.

Press (R).

VisiCalc now wants you to specify a Target. Type B1. Press (R). Look at the screen. You have replicated a group of cells at another location.

Type /R. Press (R). Type A2. You have specified that you want to copy the contents of cell A1 to a Target range of cells beginning at location A2. To tell VisiCalc the ending location, press the period (.) key. VisiCalc is waiting for an entry. Type A20. Press (R). Wow! Look at the screen. You created a whole column of labels.

with cursor at	take this action
A1	type /R type .
A1	type A2
A1	press (R)
A1	type B1 press (R)
A1	type /R press (R) type A2
A1 A1	type . type A20 press (R)

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 50

# keypoint

## REPLICATE A GROUP OF CELLS

A1...A2: C1

SOURCE RANGE: TARGET RANGE

	A	B	C
1.	YEARLY		
2.	SALES		
3.			
4.			

SCREEN BEFORE REPLICATION

	A	B	C
1.	YEARLY		YEARLY
2.	SALES		SALES
3.			
4.			

SCREEN AFTER REPLICATION

The Source range "A1...A2" is Replicated (copied) into the Target range beginning at C1. Here we show the replication of a column of cells. It is just as easy to replicate a row in the matrix. Notice that the original copy -- the Source range -- is left unchanged after the replication is performed.

Now, with only one more use of the Replicate command you will have filled your screen with labels. Type /R. Type A20. Press (R). Now specify a series of columns as the Target. Type B1. Type D1. Press (R). You have specified an entire column as the Source range and a series of columns as the Target range. It is interesting to observe at this point that to specify this Source range, you must type both the first and last coordinates in the Source range. When a Target range is specified however, you only need to indicate the coordinates of the columns (or rows) that the Source range will start to be copied into. VisiCalc will know how far down each column (or across each row) to replicate from the way you specified your Source range. Look at the screen. It should look like page 55. If not, follow the instructions at the bottom of the page to repeat this sequence again. Pretty impressive! Have you had enough exercise? If so, type /CY to clear your screen.

#### SUMMARY

You have been introduced to all of the VisiCalc BIC's (Built-In Commands). See the table on page 41. Also, you have had a chance to see the most used commands in action. Try the Quiz on page 56 to test your knowledge of the names and functions of the BIC's.

#### COMING ATTRACTIONS

In the next Chapter, you will be introduced to the Built-in Functions of VisiCalc. Functions will make building a model a lot easier.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 50

with cursor at	take this action
A1	type /R
A1	type A20 (R)
	type B1
	type D1 (R)
A1	type /CY

checkpoint 6

A1 (L) EXERCISE	C
	19

A	B	C	D
---	---	---	---

1	EXERCISE	EXERCISE	EXERCISE	EXERCISE
2	EXERCISE	EXERCISE	EXERCISE	EXERCISE
3	EXERCISE	EXERCISE	EXERCISE	EXERCISE
4	EXERCISE	EXERCISE	EXERCISE	EXERCISE
5	EXERCISE	EXERCISE	EXERCISE	EXERCISE
6	EXERCISE	EXERCISE	EXERCISE	EXERCISE
7	EXERCISE	EXERCISE	EXERCISE	EXERCISE
8	EXERCISE	EXERCISE	EXERCISE	EXERCISE
9	EXERCISE	EXERCISE	EXERCISE	EXERCISE
10	EXERCISE	EXERCISE	EXERCISE	EXERCISE
11	EXERCISE	EXERCISE	EXERCISE	EXERCISE
12	EXERCISE	EXERCISE	EXERCISE	EXERCISE
13	EXERCISE	EXERCISE	EXERCISE	EXERCISE
14	EXERCISE	EXERCISE	EXERCISE	EXERCISE
15	EXERCISE	EXERCISE	EXERCISE	EXERCISE
16	EXERCISE	EXERCISE	EXERCISE	EXERCISE
17	EXERCISE	EXERCISE	EXERCISE	EXERCISE
18	EXERCISE	EXERCISE	EXERCISE	EXERCISE
19	EXERCISE	EXERCISE	EXERCISE	EXERCISE
20	EXERCISE	EXERCISE	EXERCISE	EXERCISE

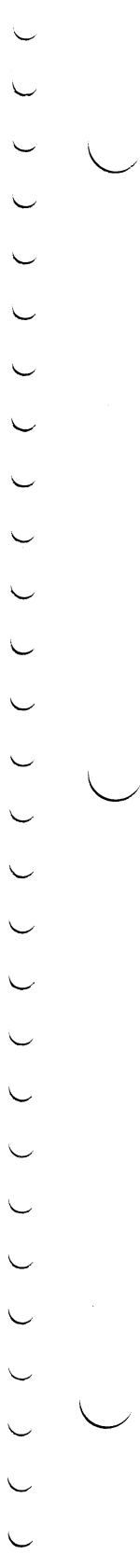
## QUIZ TWO

A list of the more familiar command keystrokes are given in Column A below. In Column B, the use of each keystroke is listed. On a separate piece of paper, write down the numbers 1 through 9 in a list. Next to each number, write the letter of the correct use for that keystroke sequence.

COLUMN A KEYSTROKE SEQUENCE	COLUMN B USE
1. /	A. Used for storing, loading, deleting, etc. VisiCalc models on a disk.
2. /B	B. Used to delete a row or column.
3. /C	C. Used to restore the contents of a cell.
4. /D	D. Used to format the contents of a specific cell.
5. /F	E. Used to display the list of BIC's available.
6. /G	F. Used to freeze a title in place.
7. /I	G. Used to cancel the / command.
8. /R	H. Used to clear (blank out) the contents of a cell.
9. /S	I. Used to replicate (copy) the contents of one or more cells into one or more other cells.
	J. Used to insert a row or column.
	K. Used to divide the screen in half.
	L. Used to make global changes across the entire matrix.
	M. Used to clear the cell contents of the entire matrix.

Turn this page upside down to view the solutions.

1. E, 2. H, 3. M, 4. B, 5. D,  
6. L, 7. J, 8. I, 9. A





Chapter 6: The Most Used VisiCalc Functions

In this Chapter you will be introduced to the most used Built-In Functions available in VisiCalc to help you build your financial models. A complete list is shown on page 153 at the end of Chapter 12.

You will use several examples stored on your tutorial diskette to see first-hand how these functions can make life easy.

Type /SL. Then specify the correct Checkpoint file by typing CP7. Press **Ⓡ**. Does it look familiar? It should look just like page 59.

with cursor at	take this action
A1	type /SLCP7 press <b>Ⓡ</b>

If you are hopelessly lost:
press the BREAK key to clear the Prompt Line type /CY to clear the screen continue at the top of this page

# checkpoint 7

A12 (L) MEXICO	FORD	C
		20

	A	B	C
1			
2	SALES	REPORT	
3			
4		LAST YEAR	CURRENT
5	SALES AREA	\$ AMOUNT	\$ AMOUNT
6	-----	-----	-----
7	NORTHEAST	100.00	200.00
8	EAST COAST	300.00	
9	SOUTHEAST	500.00	600.00
10	MIDWEST	400.00	500.00
11	SOUTHWEST	700.00	300.00
12	MEXICO		500.00
13	WEST COAST	100.00	200.00
14	-----	-----	-----
15	TOTAL	2100.00	2300.00
16	=====	=====	=====
17	REGIONS	6	6
18	W/SALES		
19			
20	HIGHEST	700.00	600.00

## SIMPLE MATHEMATICAL FUNCTIONS

Mathematical functions in VisiCalc start with the symbol @ which is the shift character on the numeral 8 key in the upper section of your keyboard. After pressing the @ symbol, you type in the name of the function. @SUM is the first function you will practice. It SUMs a series of VisiCalc matrix cells which you specify.

Move to B13. Type the value 200. Look at cell B15 on your screen. It is displaying the number 2100 as a total of last year's sales. Press (R). What happened? Cell B15 changed to 2200 when you changed the West Coast sales value from 100 to 200. How can this be?

Move to B15 and look at the Entry Contents Line.

It says "B15 (V) @SUM(B7...B13)". This tells VisiCalc to calculate the sum of the values in cells beginning at location B7 and continuing through location B13. This explains why the value in cell B15 changed when you changed the contents of cell B13.

Let's try it again. Move back to B13. Enter 400. Pretty nifty eh! Now enter the value 100. You're back where you started and your screen should look like page 59 again. Now let's learn something about the @COUNT function. Continue on the next page.

with cursor at	take this action
A12	type >B13
	press (R)
B13	type 200
	press (R)
B13	type >B15
	press (R)
B15	move to B13
B13	type 400
	press (R)
B13	type 100
	press (R)

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 58

## THE @COUNT FUNCTION

The @COUNT function is used to tally the number of non-blank cells containing values that are in a set of cells you specify. The example uses @COUNT to tally how many regions are reporting sales. The @COUNT function has been entered at location B17. Note that it currently counts 6 regions reporting sales. Remove the West Coast report. Type /B. Press (R). The count of regions with sales should now be 5.

Let's look at how this is done. Move to cell B17 containing the @COUNT function.

Look at the Entry Contents Line. It shows an entry of "@COUNT(B7...B13)". This means that Visi-Calcul will examine B7, B8, B9, B10, B11, B12 and B13 for non-blank values and will compute a tally of how many it finds. In this case it found 5 such cells.

## THE @MAX FUNCTION

The @MAX function will find the largest of a set of values that you specify. Look at cell B20. It is displaying a value of 700. Notice also that 700 is the largest amount of sales reported by any region. Let's try it out. Move to B13 and type 800. Press (R) to change the West Coast report. Look at the screen. What happened?

The @MAX function in location B20 has successfully located the new maximum regional sales amount. Move to B20 to take a closer look. Look at the Entry Contents Line.

with cursor at	take this action
B13	type /B press (R)
B13	type >B17 press (R)
B17	type >B13 press (R)
B13	type 800 press (R)
B13	type >B20 press (R)

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 58

The Entry Contents Line shows an entry of " $\text{@MAX}(\text{B7}..\text{B13})$ ". This means that VisiCalc will examine B7, B8, B9, B10, B11, B12, and B13 for the largest number and will show you what it found.

In this case it found that 800 was the largest number. Move to B13 and set the West Coast value back to 100. Note that the highest value is now 700.

As an exercise change the sales values of several regions and watch the @SUM, @COUNT, and @MAX work. Have fun!

with cursor at	take this action
B20	type >B13
B13	press (R)
	type 100
	press (R)

**If you are hopelessly lost:**

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 58

## THE @MIN FUNCTION

Load CP8 now. Type /CY. Type /SL and then type CP8. Press (R). Look at the screen. It should look just like page 64. Notice at the bottom there are two new items. The lowest sales reported (using the @MIN function) and the average sales reported (using the @AVERAGE function). The @MIN function will find the smallest value among a set of values.

While watching the screen, type -100 (R) (the - key is the same as the up arrow key without pressing the CTRL key). What happened in B17? It should now show -100 as the lowest reported regional sales. Move to B17 to take a closer look at the @MIN function.

Look at the Entry Contents Line. It shows "@MIN(B7...B13)", which tells VisiCalc to find the lowest value in B7, B8, B9, B10, B11, B12, and B13 and display it! In this case, it found that -100 was the smallest number in the cells from B7 to B13. As you will learn later, @MIN and all the other VisiCalc functions can be used as one term in a formula as well.

Move to B13 and enter the value 100. Note that B17 now displays a zero. Look at entries in cells B7 through B13.

Are there any zeros? What happened was that the blank cell at B12 evaluated to (was read as) zero when it was examined by the @MIN function.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

with cursor at	take this action
? A1	type /CY type /SLCP8 (R)
B13	type -100 press (R)
B13	type >B17 press (R)
B17	type >B13 press (R)
B13	type 100 press (R)

checkpoint 8

B13 (V) 100	C
	20

	A	B	C
1			
2	SALES	REPORT	
3			
4		LAST YEAR	CURRENT
5	SALES AREA	\$ AMOUNT	\$ AMOUNT
6	-----	-----	-----
7	NORTHEAST	100.00	200.00
8	EAST COAST	300.00	
9	SOUTHEAST	500.00	600.00
10	MIDWEST	400.00	500.00
11	SOUTHWEST	700.00	300.00
12	MEXICO		500.00
13	WEST COAST	100.00	200.00
14	-----	-----	-----
15	TOTAL	2100.00	2300.00
16	=====	=====	=====
17	LOWEST	0.00	0.00
18			
19	AVERAGE \$	350.00	383.33
20	REPORTED		

## THE @AVERAGE FUNCTION

The @AVERAGE function computes the arithmetic average of the non-blank cells specified to the function. Move to B19. Look at the Entry Contents Line. It should say "@AVERAGE(B7...B13)". Note that the result displayed is 350 dollars. Let's check it out.

B7	100
B8	300
B9	500
B10	400
B11	700
B12	blank
B13	100
Total	<u>2100</u>

Now divide the total of 2100 by the number of non-blank cells.

$$2100/6 = 350. \text{ It works!}$$

What would the average sales be if you changed the West Coast sales to 700? Try it. Move to B13 and enter the value 700. As an exercise verify that the average displayed in B19 is correct.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 63

with  
cursor  
at

take this action

B13

type >B19  
press (R)

B19

B13

type >B13  
press (R)  
type 700  
press (R)



## THE @NA FUNCTION

When you want to make sure that data have been entered before using the results of a function like @AVERAGE, you can use the @NA function. Type @NA (remember to SHIFT for @). Press **R**. Look at your screen. Notice that all of the functions (@SUM, @MIN, and @AVERAGE) have been set to the value of Not Available. By putting @NA's in cells initially, you can make sure that all required data have been entered before using a result. Type 700. Press **R**. Your results have reappeared.

The @NA function is particularly useful if the value of a cell is unknown. If the value of @NA is inserted, it will propagate an NA value in any formula or expression that references it. In this way, the results of a model may contain the "honest" values of Not Available until the user enters some data.

## THE @ERROR FUNCTION

The @ERROR function also allows you to avoid attempted calculations on erroneous data. Type 700/0. Press **R**.

VisiCalc knows that you cannot divide by 0 and generates an ERROR value. Type 700. Press **R**. Your calculations return. Although VisiCalc automatically checks for obvious errors, there may be times when you want a "good" formula to evaluate to ERROR. This is where @ERROR comes in handy.

with cursor at	take this action
B13	type @NA press <b>R</b>
B13	type 700 press <b>R</b>
B13	type 700/0 press <b>R</b>
B13	type 700 press <b>R</b>

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 63

As an example, suppose cell C30 held a complex equation that calculated Work In Progress for the current month. You have 10 employees, each billable at \$10 per hour, and none of which work more than 40 hours per week. There is a maximum of 23 working days in any given month. Thus, you know that Work In Progress would never be more than \$18,400 (10 employees times \$10 per hour, times 8 hours per day, times 23 days per month).

Using both the @LOOKUP function (see page 136) and the @ERROR function, cell C31 could hold a statement that automatically sets that cell (C31) to @ERROR (displays ERROR) when and if the formula ever logically evaluated to any amount greater than \$18,400. You would then immediately know that somewhere along the way, the values or variables referenced in cell C30 were incorrect.

Type /CY to clear the screen and get ready to build your first VisiCalc model.

#### SUMMARY

You have practiced using most of the simple mathematical functions available in VisiCalc. Try the Quiz on page 68 to test your knowledge.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 63

with  
cursor  
at

take this action

B13

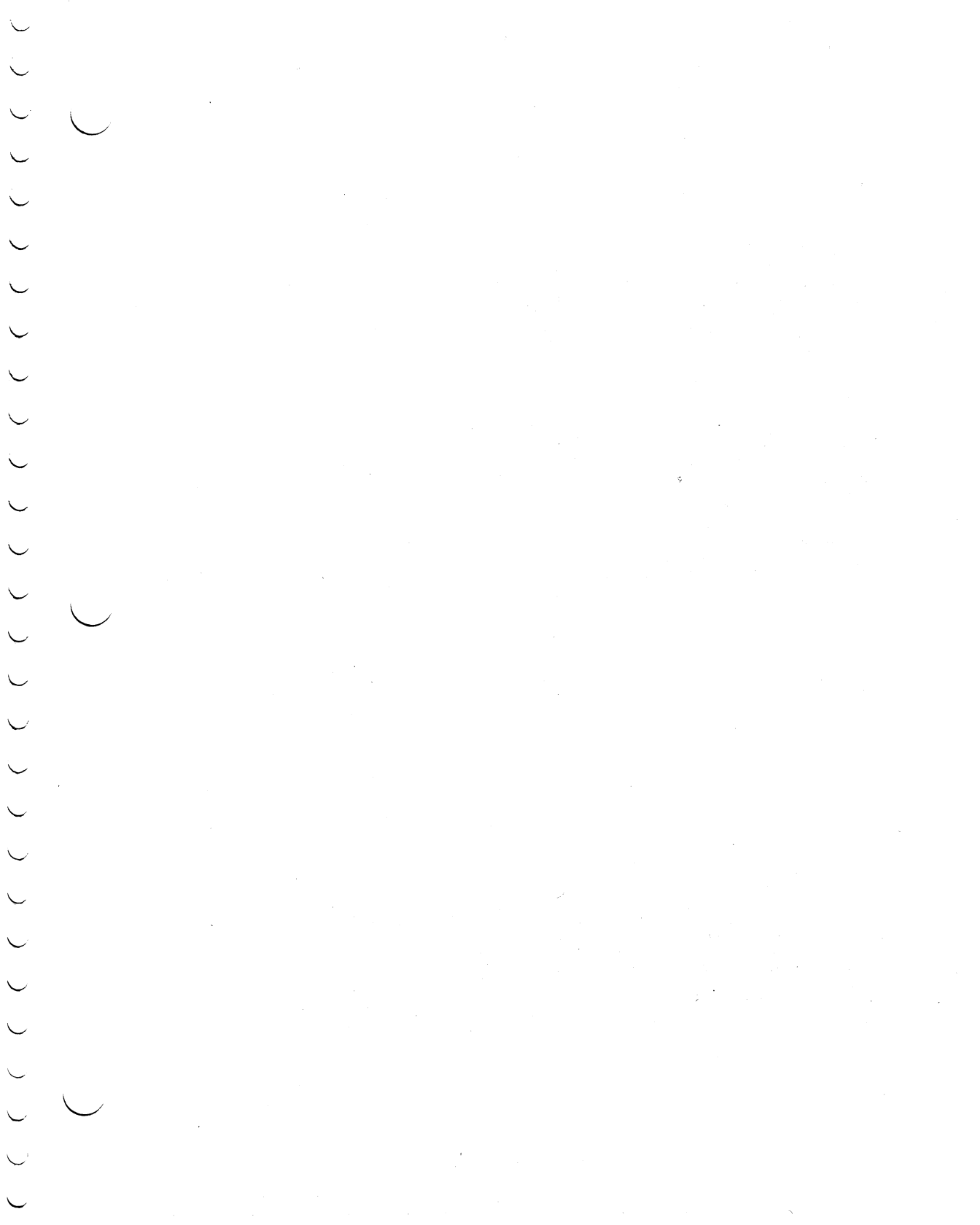
type /CY

### QUIZ THREE

1. To use a Built-In Function, you must always start with:
  - a) #
  - b) @
  - c) /
2. You can have VisiCalc add the values in a specified range by using the answer to question 1 above, and following it with:
  - a) COUNT
  - b) ADD
  - c) SUM
3. When you want to know how many cells in a specified range actually contain values, use:
  - a) @BLANK
  - b) @COUNT
  - c) @SUM
4. The @MAX function will determine the \_\_\_\_\_ in a specified range.
  - a) maximum number of values that can be entered
  - b) most frequently used value
  - c) highest value entered
5. The @MIN function will determine the \_\_\_\_\_ in a specified range.
  - a) minimum number of values that can be entered
  - b) least frequently used value
  - c) lowest value entered
6. To find the mathematical average of a specified range, use:
  - a) @AVERAGE
  - b) @ADV
  - c) @MID
7. @NA is a useful function when you want to have VisiCalc:
  - a) determine if a value is applicable in a formula.
  - b) wait to calculate other @ functions until a value is entered at the @NA cell.
  - c) make an incorrect formula evaluate to ERROR.
8. When it is necessary or desirable to have a "good" formula evaluate to ERROR, use the \_\_\_\_\_ function.
  - a) @ERROR
  - b) @NA
  - c) @NO

Turn the page upside down to view the solutions.

1. b, 2. c, 3. b, 4. c,  
5. c, 6. a, 7. b, 8. a



## PART II: BEGINNING TUTORIAL

### Chapter 7: Lay Out a Model

As you saw in the introduction, VisiCalc is a sophisticated, but easy to use computer program. It enables inexperienced computer users to develop and use complex interactive mathematical Models without tedious calculating processes. If you (the user) understand how something should be calculated, you can have VisiCalc do it for you. VisiCalc is most often used in financial modeling, and in both business and personal finance applications.

In this Chapter you'll go through the steps of the development and evolution of a very simple financial model, as shown on the following page. You will use VisiCalc and your ATARI computer to build the model. By following the instructions and illustrations, you will recreate this model. You will also learn enough about using VisiCalc to be comfortable in planning more complex models of your own. Take a few minutes now to familiarize yourself with the model (page 71), before continuing on.

with  
cursor  
at

take this action

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

# keypoint

$$\begin{aligned}\text{FEB INCOME} &= (\text{LAST MO'S INCOME} \times (\text{GROWTH RATE}/100)) + \text{LAST MO'S INCOME} \\ &= (10000 \times (10/100)) + 10000 = 11,000\end{aligned}$$

$$\begin{aligned}\text{FEB EXPENSES} &= (\text{LAST MO'S EXPENSES} \times (\text{GROWTH RATE}/100)) + \text{LAST MO'S EXPENSES} \\ &= (7500 \times (10/100)) + 7500 = 8250\end{aligned}$$

## PROFIT ANALYSIS

	JAN 1980	FEB 1980	MAR 1980	APR 1980	MAY 1980	JUN 1980	JUL 1980	AUG 1980	SEP 1980	OCT 1980	NOV 1980	DEC 1980	YR TOTAL
INCOME	10000.00	11000.00	12100.00	13310.00	14641.00	16105.10	17715.61	19487.17	21435.89	23579.48	25937.42	28531.17	213843
EXPENSES	7500.00	8250.00	9075.00	9982.50	10980.75	12078.83	13286.71	14615.38	16076.92	17684.61	19453.07	21398.38	160382
PROFIT	2500.00	2750.00	3025.00	3327.50	3660.25	4026.28	4428.90	4871.79	5358.97	5894.87	6484.36	7132.79	53461

>>> GROWTH RATE : 10 %

$$\begin{aligned}\text{INCOME} - \text{EXPENSES} &= \text{PROFIT} \\ 10000 - 7500 &= 2500\end{aligned}$$

TOTAL INCOME = The sum of each month's income

TOTAL EXPENSES = The sum of each month's expenses

TOTAL PROFIT = The sum of each month's profit

Remember, the box at the bottom of each page contains exact instructions for going back to the last Checkpoint screen that you have passed in this section. For example, the instruction sequence at the bottom of this page will clear your screen so that you can begin again from page 70.

Start creating your financial model. You'll begin with a very simple business relationship (or Expression) -- income minus expenses equals profit. You are going to enter labels, values and formulas that will VISIBly express this relationship. The instructions in this part of the tutorial have been shortened since you are now an experienced VisiCalc user. But if you forget some of the movements, refer to the Index at the back of this book for page references.

#### ENTER THE LABELS FOR THE MODEL

What's first? You need to label the key rows containing the INCOME, EXPENSES and PROFIT. The cursor is at A1. Type INCOME. Press the RETURN key. Move to A2 and enter the label EXPENSES. Next, move to A3 and enter PROFIT.

Putting labels on your model helps you remember what you intend to do in each area of the VisiCalc matrix and also helps make your model easier to understand by others. We'll add more labels later to improve the model's readability. The next step in building a model is to enter the values which are not computed by a formula. For a simple version of a Profit Analysis Model, let's assume that you already know the value of both income and expenses.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 70

with  
cursor  
at

take this action

A1

enter INCOME

A2

move to A2  
enter EXPENSES

A3

move to A3  
enter PROFIT

checkpoint 9

A3	(L)	PROFIT	C
			21

	A	B	C	D
1	INCOME			
2	EXPENSES			
3	PROFIT			
4				
5				
6				
7				
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## ENTER THE DATA FOR THE MODEL

Move the cursor to B1. Note that the upper left corner of the screen always displays the location of the cursor (B1 in this case). Recall that this top line is designated the Entry Contents Line.

Let's enter a value for income. Type 10000.

Press **(R)**. Notice that the Entry Contents Line fills out to display the Value indicator (V) and the actual expression (10000). Compare cell A1 and B1. You may have noticed that INCOME is left-justified in cell A1 (pushed against the left margin of the cell), and 10000 is right-justified in B1 (pushed against the right margin of the cell). Values will always be right-justified. Justification is an example of "formatting". Recall that formatting is the process of specifying how and where a value or label is to be displayed in the cell. Labels are left-justified unless explicitly formatted differently.

After you enter a formula or expression (by typing it and then pressing **(R)**), its value is calculated and displayed in the cell.

with cursor at	take this action
A3	move to B1
B1	type 10000
B1	press <b>(R)</b>

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP9 **(R)**  
 continue at the top of this page

checkpoint 10

B1	(V)	10000	C
			21

A	B	C	D
---	---	---	---

1	INCOME	10000		
2	EXPENSES			
3	PROFIT			
4				
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Now, type in a value for expenses. Move to B2 and enter 7000. Did you remember to press (R)?

This completes the basic data required of the most simple form of a Profit Analysis Model. Now that the data is entered, you are ready to enter the formula part of the model.

#### DEVELOPING THE FORMULA FOR YOUR MODEL

Since you wish to calculate profit, subtract expenses from income. Algebraically, this is:

$$\text{PROFIT} = \text{INCOME} - \text{EXPENSES}$$

In terms of the numbers you have placed in your model, this is:

$$\text{PROFIT} = 10000 - 7000 = 3000$$

If we were interested in calculating a single instance of INCOME-EXPENSES, typing 10000-7000 would be sufficient. To make this expression more general, we can enter a formula. A formula is just an expression described in terms of numbers and symbols. An example of a simple formula is PROFIT=INCOME-EXPENSES. Here's what you do to tell VisiCalc how to carry out the computation. Since VisiCalc does recognize cell locations, this formula can be translated into appropriate VisiCalc coordinates. Thus:

$$B3 = B1 - B2$$

You can enter the formula B1-B2 in cell B3, and have a formula which is the same as PROFIT=INCOME-EXPENSES.

Let's have VisiCalc do the arithmetic. Move to B3 now.

with  
cursor  
at

B1  
B2

take this action

move to B2  
enter the  
value 7000

B2

move to B3

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP10 (R)  
continue at the top of this page

checkpoint 11

B3	C
	20

A	B	C	D
---	---	---	---

1	INCOME	10000		
2	EXPENSES	7000		
3	PROFIT			
4				
5				
6				
7				
8				
9				
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## BLANKING OUT A CELL -- THREE METHODS

Try typing B1-B2 (R). Notice anything strange? "(L)" appears on the Entry Contents Line. VisiCalc entered a label, because your expression began with an alphabetic character. First, let's blank out B3. There are three ways to do this:

- 1) Use the Blank command. Type /B. Remember B is a BIC meaning "Blank", as you can see on the Prompt Line and in the cursor at B3. Selecting the Blank command allows you to blank out the entire cell where the cursor is located. The command is executed when RETURN is pressed. Type (R) to complete the command.
- 2) Type B1-B2 (R) to give us the opportunity to blank out B3 again, this time using a different method. Type " (press the SHIFT key down and hold it, type a 2) just one time. The " character does not appear on your screen. At this point, the cell has been set to accept a label, and a cursor is prompting you for the label on the Edit Line. If you press the (R) key, the previous contents of the location will be cleared out. Type (R) and the label gets entered as a blank.

with cursor at	take this action
B3	type B1-B2 (R)
B3	type /B
B3	press (R)
B3	type B1-B2 (R)
B3	type "
B3	press (R)

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP11 (R)  
 continue at the top of this page

- 3) A third way to erase an error is simply to type over it with a new entry. Whatever you enter into a cell will replace what is there, once you press **Ⓡ**. Type "1ST **Ⓡ**". You will blank this error out in a moment by simply entering the correct replacement described below.

#### ENTERING A FORMULA

Now, let's enter our formula at B3. Since our formula starts with a B, and we know that VisiCalc will expect a label if we enter a B as the first character, we must enter the formula in a slightly different form. Again, the formula is B1-B2 (or INCOME minus EXPENSES). The following are acceptable ways to enter this expression (the first is the most commonly used, but all of them will work):

+B1-B2 **Ⓡ**

-B2+B1 **Ⓡ**

0+B1-B2 **Ⓡ**

(B1-B2) **Ⓡ**

Try to figure out why these formulas work. If you can't think of a reason, notice that three of the formulas start off with a mathematical symbol of +, -, or (. In the third formula, a value of 0 is entered first.

Try all of these formulas, just to convince yourself and get practice. Your screen should look like page 80 before proceeding.

There are other ways to begin a formula. The following characters are suitable ways to signal VisiCalc that an expression or value is forthcoming:

+ - . ( 0 through 9

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt line  
type /CY to clear the screen  
type /SLCP11 **Ⓡ**  
continue at the top of this page

with  
cursor  
at

take this action

B3

type "1st  
press **Ⓡ**

B3

type +B1-B2 **Ⓡ**

B3

practice entering  
formulas

checkpoint 12

B3	(V)	+B1-B2	C
			20

	A	B	C	D
1	INCOME	10000		
2	EXPENSES	7000		
3	PROFIT	3000		
4				
5				
6				
7				
8				
9				
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## INSERTING ROWS & COLUMNS

Before you go any further, make the model a little easier to look at. You're going to draw a horizontal line between EXPENSES and PROFIT. First, you need to make a space between the two. Recall that an easy way to do this is to use one of the BIC's, and insert a row.

Type /I to perform the Insert command. The Prompt Line asks for a choice of R or C (Row or Column). If you select C (column), then a column of blanks will be inserted between the cursor and the left margin. If you select R (row), a row of blanks will be inserted directly above the cursor location.

Type R. Automatically, a new blank row is inserted, and everything below was moved down one row.

If you accidentally inserted too many rows, remember the BIC available for deleting rows and columns. It is /D, and it works just like /I except that it deletes the row or column the cursor is on. Everything below the cursor is moved up one row.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP12 <sup>®</sup>  
continue at the top of this page

with cursor at	take this action
B3	type /I
B3	type R



## REPEATING LABELS (DRAWING LINES, ETC)

Now you have a blank line at row 3. The obvious way to enter a dash line is to type a series of dashes. Unfortunately, VisiCalc thinks dashes are minus signs (as you remember from entering our profit formula). If you type a quote first, and then you type a dash line, it will work. But there is an easier way. Remember from the introduction, a BIC is available to type repeating labels. Type /-. "Label: Repeating" appears on the Prompt Line. You are prompted for the character(s) to be repeated. Whatever you type will be repeated until it fills the cell. Type - (R). Pretty nifty. Now move to A3 and draw your line there also. You might try some different characters to repeat. For example, \$, +, =, and +- can be used to create interesting lines. When you are finished experimenting, type /-- (R) to make your screen like page 83.

with cursor at	take this action
B3	type /-
B3	type - press (R) move to A3
A3	draw line experiment

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP12 (R)  
continue from the top of page 81

checkpoint 13

A3 (-) -	C
	20

	A	B	C	D
1	INCOME	10000		
2	EXPENSES	7000		
3				
4	PROFIT	3000		
5				
6				
7				
8				
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## OPERATORS AND ORDER OF OPERATIONS

The arithmetic Operators used by VisiCalc are as follows:

- + addition
- subtraction
- / division
- \* multiplication
- ^ exponentiation

VisiCalc evaluates expressions strictly from left to right, without regard to which operator is where. The order of evaluation can be changed by using parentheses. For example, when using VisiCalc:

$$12+6/3 = 6$$

How does this happen? Beginning at the left, VisiCalc adds  $12+6$  to obtain 18. Next, VisiCalc divides by 3 to obtain 6. By placing parentheses around the  $6/3$ , you can obtain a different result entirely:

$$12+(6/3) = 14$$

This time, VisiCalc adds 12 to the quantity inside the parentheses. Since 6 divided by 3 is 2, VisiCalc adds this quotient to 12 and obtains 14.

### \*\*\*Exercise\*\*\*

Try to compute the following expressions (without using VisiCalc) to test whether you understand this feature.

$$15+3/6+2$$

$$19+9-6*2-3$$

Turn this page upside down to view the solution

14  
5

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP13 <sup>®</sup>  
continue at the top of this page

with  
cursor  
at

take this action

## AUTOMATIC RECALCULATION

Have you observed VisiCalc's automatic recalculation feature? Unless instructed otherwise, VisiCalc will always recalculate all values in your model whenever a new value or formula is entered.

At times, however, it will be faster not to have VisiCalc recalculate your model each time a new value or formula is entered. Automatic recalculation can be "turned on and off" using the Global subcommand of R(ecalculate).

By typing /GR, VisiCalc will prompt you to indicate whether you want recalculation performed M(annually) -- by yourself, or A(utomatically) -- by VisiCalc after each new value or formula entry.


An important thing to remember about using the Manual subcommand is that values in a model will only be recalculated when and if you type the exclamation symbol (!). If this symbol is never pressed, new values or formulas entered will have no effect on the rest of the model.

### \*\*\*Exercise\*\*\*

Move the cursor to B1. Replace the value displayed there with 12000. What happens to the profit? Notice it changes to 5000. Try changing the value for expenses. When you are comfortable with how this works, see if you can change the model to calculate expenses as a percent of income. With your income at 12000, enter a formula at B2 to express expenses as 70% of income. Your screen will look like Checkpoint 14. Try to solve this yourself before turning this page upside down. (Hint: the symbol for multiplication is \*, and / is the symbol for division)

move cursor to B2  
enter: +B1\*.7

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP13   
continue from the top of page 84

with  
cursor  
at

take this action

## checkpoint 14

B2 (V) +B1*.7	C
	20

1	INCOME	12000	
2	EXPENSES	8400	
3	-----	-----	
4	PROFIT	3600	
5			
6			
7			
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When you fully understand how these formulas work, replace the old values in cells B1 and B2 by entering 7000 in B2 and 10000 in B1.

#### FORMATTING

Now add some more niceties. As you know, there is a very useful Built-In Command for formatting, called F (curiously enough). Type /F. This specifies the BIC Format.

At this point, the available Format types appear on the Prompt Line:

```
D default
G general
I integer
L left-justified
R right-justified
$ dollars & cents
* graphs
```

The format types we are interested in at this time are I and \$, which affect only values, L and R, which affect labels and values, and G, which returns any of the formats just mentioned to the normal (General) format (remember that the General format for values is right-justified, and is left-justified for labels). Type \$ and see what happens. The format for the cell at the cursor location changed to display dollars and cents. Type /FG and the value at B1 returns to the General format.

It is important to note that formatting affects only the way that values or labels are displayed -- actual values are used in all calculations and full labels are always stored in the computer's memory.

One nicety for improving your model is to add titles. First add two rows at the top of your model. Now type in JAN 1980 as a title for column B. Use the Format command to right-justify this title. Finally, insert a horizontal "dash" line at A2 and B2.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP14 (R)  
continue at the top of this page

with cursor at	take this action
B2	enter 7000
B1	move to B1 enter 10000
B1	type /F
B1	type \$
B1	type /FG
B1	type /IR
B1	type /IR
B1	type JAN 1980 (R)
B1	type /FR move to A2
A2	type /-- (R)
	move to B2
B2	type /-- (R)

Experiment with the /F BIC and use what you have learned to get your screen to look like the following page. Check the details very closely on this exercise.

Note that the Format chosen for a cell is displayed as /FR (or D, G, I, L, \$, \*) on the Entry Contents Line.

Check to make sure you caught all the details in the exercise -- cells A3, A4, and A6 are formatted R, for right-justify, and cells B3, B4, and B6 are formatted \$, for dollars and cents.

with cursor at	take this action
B1	experiment

**If you are hopelessly lost:**

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP14 (R)  
continue from the top of page 87

# checkpoint 15

B1	/FR	(L)	JAN 1980	C
				20

A	B	C	D
---	---	---	---

1	JAN 1980		
2	-----	-----	
3	INCOME	10000.00	
4	EXPENSES	7000.00	
5	-----	-----	
6	PROFIT	3000.00	
7			
8			
9			
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20			



## QUIZ FOUR

1. Unless explicitly formatted, labels and values entered will always be left-justified. (True or False)
2. The easiest way to right-justify a label is to first type the correct number of blanks. (True or False)
3. Which of the following are VALID formulas?
  - (a)  $+3+((A1-A2)-A3)$
  - (b)  $A1-A2+3$
  - (c)  $(A1-A2)+3$
  - (d)  $.999*C5$
  - (e)  $-D2$
4. VisiCalc will evaluate  $6/2/3$ ,  $(6/2)/3$  and  $6/(2/3)$  to the same value. (True or False)
5. After pressing the " key, which of the following can be entered as VALID labels:
  - (a) (INCOME)
  - (b) -INCOME-
  - (c) "INCOME"
  - (d) INCOME
  - (e) all of the above
6. /IR will cause a blank row to be inserted:
  - (a) above the row the cursor is on.
  - (b) below the row the cursor is on.
  - (c) at the top row (row 1).
7. /IC will cause a blank column to be inserted:
  - (a) to the left of the column the cursor is on.
  - (b) to the right of the column the cursor is on.
  - (c) at the far left margin (column A).
8. Which of the following, if any, will result in a horizontal "dash" line filling a cell:
  - (a)  $/- \textcircled{R}$
  - (b)  $/-- \textcircled{R}$
  - (c) " and then hold down the - key until the line is made.

Turn this page upside down to view the solutions.

1. F, 2. F, 3. a, c, d, e, 4. F, 5. e, 6. a, 7. a, 8. b, c

## Chapter 8: Perform Calculations

One of the most useful features of VisiCalc is the Replicate command. Replication can be defined as reproducing the contents of one or more cells into other cells. You can use this command to reproduce labels, numbers, formulas, and formats. Replication can occur down columns or across rows, or both. Consider what you've already learned about replication. You've already learned how to replicate a label from a "Source range" to a "Target range". Remember when you filled your matrix with the word EXERCISE?

Well, this Chapter will go over what you already know about replicating, as well as teach you more advanced uses of it. You will learn to expand your "Profit Analysis Model" by replicating numeric values, formats and formulas to encompass a full year.

To successfully accomplish this objective, you will also learn to do the following:

- Replicate values and labels from one cell to another cell.
- Replicate values and labels from one cell to a group of cells.
- Replicate values and labels from one group of cells to another group of cells.
- Replicate a format.
- Replicate a formula.

This is the hardest part of VisiCalc to learn. But don't worry, you'll practice enough exercises to become a pro.

You can replicate at several levels. First, you can replicate one cell to one other cell. For example, you could repeat your January income for February. Second, you can replicate one cell to a group of cells. For example, you could repeat your January income for the entire year. Third, you can replicate one group of cells to another

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP15 <sup>®</sup>  
continue at the top of this page

with  
cursor  
at

take this action

group of cells. For example, you could replicate both your income and expenses across the whole year simultaneously.

The next section refers to replicating different types of information such as numbers, labels and so on. Replication of labels, formats and values is straight forward since they are simply copied from one cell to the next. Replication of formulas can become slightly more complicated since the formulas can change. Formulas will be discussed in a later section. The following exercises provide an opportunity for you to practice using the Replicate command.

### ONE TO ONE REPLICATION

The simplest use of Replicate is to duplicate a label in one cell into another cell. We'll take the label at B1 (JAN 1980) and make a copy of it at C1. The cursor should be at B1. Type /R. Look at the Prompt Line. It says "Replicate: Source range or RETURN". In VisiCalc, a cell you want to reproduce is called a Source cell. If you are replicating more than one cell, this is referred to as a Source range. Since you only want to replicate one Source cell (JAN 1980), press the RETURN key. Notice that the Edit Line now shows your Source range as "B1...B1". VisiCalc represents a range of cells using three dots (...) called an ellipsis. In this example your range is only one cell, because there is only one cell present within the cell range of B1 to B1. The same format could be used to represent an entire row in your model, such as B1...M1.

Now look at the Prompt Line again. It says "Replicate: Target range". A group of cells you want to reproduce into is called a Target range. In this example, your Target range is C1 so type this now and press (R). You should now see the label JAN 1980 repeated on your screen at C1.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP15 (R)  
continue from the top of page 91

with cursor at	take this action
B1	type /R
B1	press (R)
B1	type C1 press (R)

## ONE TO GROUP REPLICATION

That probably seemed like a lot of work just to make one copy of B1. Well, it was. Now let's try the same thing with a range of Target cells. You're going to need 12 different monthly columns in the model, so replicate B1 across 12 columns. The cursor should be at B1. Type /R. Press **(R)** to complete the Source range specification. Now for the Target range -- type C1, which is where we want to start replicating, and type M1, which is where we want to stop replicating (B1 through M1 is 12 columns). Before pressing RETURN, look at the Edit Line. It says "B1...B1: C1...M1". Notice that a colon (:) is used to separate the Source range from the Target range. Press **(R)** and the deed is done. Move the cursor out to M1 to verify for yourself that it really did work. You just replicated from one Source cell to a range of Target cells (C1 through M1).

### \*\*\*Exercise\*\*\*

Move your cursor down to A30. Enter the label RENT. Then in B30 enter the value 500. Practice replicating this rent amount across row 30 to M30. Turn the page upside down to view the solution.

type >A30 **(R)**, enter RENT  
type >B30 **(R)**, enter 500  
type /R **(R)** C30 M30 **(R)**

## GROUP TO GROUP REPLICATION

Another use of Replication is to duplicate a range of Source cells into a range of Target cells. Let's copy the contents of cells B1 and B2 across both rows 1 and 2.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP15 **(R)**  
continue from the top of page 91

with  
cursor  
at

take this action

B1

type /R  
press **(R)**  
type C1  
type M1

B1

B1

press **(R)**  
move to M1  
check results

M1

In other words, you will try to copy both B1 and B2 across 12 columns, using one Replicate command. Move the cursor to B1. Follow the key sequence below, slowly and thoughtfully:

/R B2 (R)

Look at your Edit Line. It shows that your Source range is B1...B2. Now type C1 M1 and your Target range will also show up in the Edit Line. Press RETURN and watch your screen. Both JAN 1980 and the dashed line below it will replicate across your model. You just replicated a range of Source cells into a range of Target cells. Congratulations!

Your screen should look like Checkpoint 16 on the following page. Do this sequence several times if necessary, so that you can see how it works. Notice that even though your Target range included two rows (C1 to M1 and C2 to M2), you only needed to type in the first cell of each column. This will always be the case when you are replicating a range of Source cells into a range of Target cells.

As an added twist, you might experiment replicating a blank cell. You can erase JAN 1980 using any one of the three methods for blanking a cell (pp. 78-79). Then replicate the blank across row one, causing JAN 1980 labels to disappear. You will notice, or you will discover in the next section, that the right-justified format will remain, even after these cells are blanked out. If you try this experiment, be sure to replace all of those JAN 1980's using the Replicate command.

with cursor at	take this action
?	move cursor to B1
B1	type key sequence on left
B1	type C1 M1
B1	press (R)
B1	experiment

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP15 (R)  
 continue from the top of page 91

# checkpoint 16

B1 /FR (L) JAN 1980	C
	19

A	B	C	D
---	---	---	---

1	JAN 1980	JAN 1980	JAN 1980
2			
3	INCOME	10000.00	
4	EXPENSES	7000.00	
5			
6	PROFIT	3000.00	
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

\*\*\*Exercise\*\*\*

Move your cursor down to A31. In cell A31 enter the label UTILITIES and in cell A32 enter the label TELEPHONE. Now move to B31 and enter 600. In cell B32 enter 300. Try to replicate these 2 new values together through column M. Turn the page upside down to view the solution.

type >B31

type /R . B32

type C31 M31

REPLICATE A FORMAT

In addition to replicating labels, you can replicate values and formats. You already labeled all the columns of the model with JAN 1980. So what good is having JAN 1980 as the header for all twelve columns? Move the cursor to B1. Now you'll see that Replicate also copies explicit formats -- in this case, /FR (right-justified format). Remember, you already entered this format at Checkpoint 15. Now we can move the cursor across the screen one cell at a time, typing in the appropriate label for each column, and the format is already taken care of for each one. Go ahead now and type in 3-letter month names (and the year) for each column, starting at C1. By the way, you don't have to press **R** after each entry -- pressing any arrow key will have the same effect and move the cursor.

Your screen should look like Checkpoint 17 on the following page.

If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP16 **R**  
continue at the top of this page

with cursor at	take this action
B31	move cursor to B1
B1 C1	move cursor to C1 begin typing in column headers

## checkpoint 17

	N1	C	
		19	
	K	L	M
	OCT 1980	NOV 1980	DEC 1980
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			



Now we're getting somewhere. Move the cursor back to A1, so we can see what we're doing. Try this problem. Replicate B3, B4, and B5 for all 12 months with one Replicate command. We'll leave B6 for last, since it contains a formula and is treated a little differently.

This is the key sequence you should have just used:

>B3 (R) /R B5 (R) C3 M3 (R)

Your screen should look like Checkpoint 18 on the following page.

with cursor at	take this action
N1	move to A1
A1	move to B3
B3	exercise

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP17 (R)  
 continue at the top of this page

# checkpoint 18

B3 /F\$ (V) 10000	C
	19

A	B	C	D
---	---	---	---

1		JAN 1980	FEB 1980	MAR 1980
2	-----	-----	-----	-----
3	INCOME	10000.00	10000.00	10000.00
4	EXPENSES	7000.00	7000.00	7000.00
5	-----	-----	-----	-----
6	PROFIT	3000.00		
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

## REPLICATING A FORMULA

The profit line, as you may recall, contains a formula for PROFIT which is INCOME minus EXPENSES. Move your cursor to B6. Look at the Entry Contents Line. You will see the formula +B3-B4. Any cell that contains a formula will always display the formula on the Entry Contents Line when the cursor is at that cell. Notice something different about this formula now? When you inserted rows 1 and 2, the other rows were pushed down. The formula Automagically changed from +B1-B2 to +B3-B4.

In this section you will learn how to replicate a formula. You want to replicate your profit formula across the 12 monthly columns. In other words, the formula INCOME minus EXPENSES will be repeated across all 12 months to calculate a monthly profit margin. Try this now.

With the cursor at B6, type /R (R) C6 M6 (R)

Study the three lines at the top of the screen. The top line, Entry Contents, shows the formula you are replicating (+B3-B4). The second line, Prompt Line, shows that you can pick either N=No change or R=Relative to indicate how to replicate each term of the formula (+B3 is the first term of the formula and +B4 is the second term). On the third line, the Edit Line, the first term of the formula (+B3) is displayed. VisiCalc is asking you to decide whether +B3 should be considered a relative term or a term that won't change.

Relative replication is a very important part of the Replicate command. Relative replication can be defined as reproducing a cell containing a formula in which one or more of the terms change when the formula is reproduced in a Target range. Since the value of the first term in the formula (income) could change across the 12 months, type R for Relative. Now the next term in the formula (+B4 which represents expenses) appears in the cursor on the Edit Line. Since your expenses also can change during the 12 months, type R again.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP18 (R)  
continue at the top of this page

with cursor at	take this action
B3	move to B6
B6	type /R (R) C6 M6 (R)
B6	type R
B6	type R

VisiCalc instantly performs its wonders. Using the right arrow key, scroll across on row 6 all the way out to M6. Watch the Entry Contents Line and you see the terms in the formula continue to change. Your screen should look like Checkpoint 19.

You could fix the model so that income increases by 10% each month. In other words, your January income of \$10,000 would increase by 10% to equal \$11,000 for February. In like fashion, your March income would be \$11,000 + 10% of \$11,000. In this example the previous month's income is a relative term in the formula, that is, a term which changes. The formula for increasing January income by 10% is 1.1\*B3. Try entering this formula for February income at C3 and replicating this formula for every month, as shown below:

>C3 (R) 1.1\*B3 (R) /R (R) D3 M3 (R) R

Move the cursor out to M3 and view the results. Have sales increased by 10% each month? When you've got it right, income in December 1980 will be 28531.17. Since the amount of the previous month's income changed in each cell along row three, you used relative replication. If you had pressed N rather than R in the above formula, VisiCalc would have treated income as a constant term, a term which does not change. It would have calculated \$11,000 across the whole matrix.

with  
cursor  
at

take this action

B6

scroll to M6  
using the right  
arrow key

M6

exercise

C3

move cursor  
to M3

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP18 (R)  
continue from the top of page 100

checkpoint 19

M6 /F\$ (V) +M3-M4					C
					18
1	SEP 1980	OCT 1980	NOV 1980	DEC 1980	
2	-----	-----	-----	-----	
3	10000.00	10000.00	10000.00	10000.00	
4	7000.00	7000.00	7000.00	7000.00	
5	-----	-----	-----	-----	
6	3000.00	3000.00	3000.00	3000.00	
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Using what you have learned about formulas and replication, fix the model so that expenses are always 75% of income. (Hint: Remember to perform two steps. Place a formula in B4 and then replicate out to M4.) When you're done, the December 1980 expenses will be 21398.38 and the December 1980 profit will be 7132.79. Move the cursor out to M4 and check your answers against Checkpoint 20. If you got this right, pat yourself on the back. You're a star.

If you didn't get it right yet, type the following sequence slowly and thoughtfully:

```
>B4 (R) +B3*.75 (R)
/R (R) C4 M4 (R) R
```

It is important that you understand how these "solutions" work. If you don't understand how these replication results are related to the typing sequences, use the instructions in the box below to get another chance at it. Go slowly and thoughtfully through the sequences. Now scroll the cursor to M4. Your screen should look like Checkpoint 20.

with cursor at	take this action
B4	scroll cursor to M4

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP19 (R)  
continue from the top of page 101

checkpoint 20

M4 /F\$ (V) +M3*.75					C
					18
1	SEP 1980	OCT 1980	NOV 1980	DEC 1980	
2	-----	-----	-----	-----	
3	21435.89	23579.48	25937.42	28531.17	
4	16076.92	17684.61	19453.07	21398.38	
5	-----	-----	-----	-----	
6	5358.97	5894.87	6484.36	7132.79	
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

## REPLICATION BY POINTING

Another way to replicate a range of cells is to use the arrow keys. Instead of typing in every cell identification, you use the arrow keys to denote the cells. Your computer will automatically accept this cue and print the cell identification on your screen. Let's try replicating the formula in B6 across row 6 once again. This time use the arrow keys. With the cursor at B6, type /R. Press RETURN. By pressing RETURN, the computer accepted B6 as your Source range without you typing it in. Hold the CTRL key and press the right arrow key so the cursor moves to C6, then type a period. By typing a period, you tell your computer to accept C6 as the entry point of the Target range. Now hold the CTRL key down and press the arrow key eleven times. Notice that as you move the cursor to D6, E6, F6, and so on, the Target range on the Edit Line continues to change. After you have pressed the arrow key eleven times, the cursor will rest on M6. The Edit Line will read "B6...B6: C6...M6" (if you moved too far with the right arrow key, you can move back with the left arrow key). Now press RETURN. You've told the computer to accept M6 as the last cell in the Target range. The cursor jumps back to B6, where the original formula is stored. Since income and expenses will again both be considered relative, type R twice. This time the numbers on your screen won't actually change, since you have already performed this operation.

with cursor at	take this action
M4 B6	move to B6 type /R press Ⓡ
B6	move to C6 type a period (.)
B6	move using right arrow key to M6
M6	press Ⓡ
B6	type R twice

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP20 R  
continue at the top of this page



\*\*\*Exercise\*\*\*

Move your cursor to A36. Now move to A34 and type in "TOTAL". Move to B34 and type in a formula that will total your rent, utility and phone expenses. Once you have developed the formula, practice replicating the formula across row 34 out to column M. Try using the arrow keys to denote the Target range. Turn the page upside down to view the solution.

type >B34 (R) +B31+B32+B33 (R) /R (R)  
press right arrow key once, type period (.)  
scroll w/right arrow to M34, type (R) R R R

with cursor at	take this action
B6	move to A36 and exercise

If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP20 (R)  
continue from the top of page 105

## SUMMARY

You have learned a lot in this section. Replication is a most versatile part of VisiCalc. A summary of the critical ingredients for using the Replicate command is presented below.

1. Move your cursor to the first Source Cell you want to reproduce.
2. Press /R to start the Replicate command.
3. Indicate the Source Range as follows:
  - a. If this is the only Source cell, press RETURN.
  - b. If there is more than one Source cell, use the arrow key to move the cursor to the last entry in the Source range and press RETURN.
4. Use the arrow key to move the cursor to the beginning point of the Target range.
5. Indicate the Target Range as follows:
  - a. If this is the only Target cell, press RETURN.
  - b. If there is more than one Target cell, type a period (.) and then use the arrow key to move the cursor to the last entry in the Target range. Press RETURN.
6. If you are replicating a formula, press either N or R for each term in the formula depending on whether the term should be left unchanged (N) or changed relative (R) to its use in each cell.

Try the Quiz on the following page to test your knowledge of replication.

If you are hopelessly lost:

with  
cursor  
at

take this action

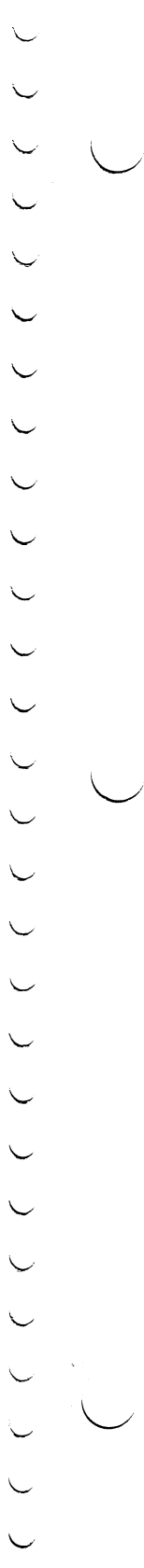
## QUIZ FIVE

Directions: Match the correct term with each definition by writing in the correct letter in the blank.

<u>Terms</u>	<u>Definitions</u>
a. Target range	— A cell you want to reproduce.
b. Replication	— A description of a term in a formula you are replicating which remains constant.
c. A1...A1: B1...M1	— Reproducing the contents of one or more cells into other cells.
d. Source cell	— A sample sequence you would type for replicating Source cells into a range of Target cells.
e. /R (R) D5 M5 (R) R R	— A sample sequence you would type for replicating a formula.
f. /R B7 (R) D1 M1 (R)	— A sample of the information that would show up on the Edit Line when you replicate.
g. N = No Change	— A group of cells you want to replicate into.
h. R = Relative	— A description of a term in a formula you are replicating which changes when the formula is reproduced in a Target range.

Turn this page upside down to view the solutions.

y 'e 'c 'a 'j 'q 'b 'p



## Chapter 9: Improve the Model Format

Great. The model is really beginning to get interesting. Now, as a Tycoon, there are several other features of VisiCalc that you will find useful. One such feature is called Built-In Functions.

### BUILT-IN FUNCTIONS

As you learned in the introduction, VisiCalc has a number of functions built-in, so that using them is very simple. A function is a mathematical procedure which is available to the user via a simple command. The VisiCalc symbol for Built-In Function is @, the "at" sign. (The @ character is typed by holding down a SHIFT key and typing 8.) As you learned in the introduction, some of the functions available include:

@SUM	@MIN
@COUNT	@MAX
@AVERAGE	etc. (see pages 60-67)

You'll make good use of @SUM in your model. You can easily get totals for INCOME, EXPENSES, and PROFIT for the 12 month period of the model.

Move the cursor to N1. Type in and right-justify the label YR TOTAL. Draw a line in N2. Move the cursor to N3. Type the expression @SUM(B3. To access the ( symbol, press the SHIFT key down and hold it, type a 9. The year total for income will be the sum of incomes from B3 through M3. So, you must indicate a range in the SUM function. Type a period. This will cause VisiCalc to display an ellipsis (range indicator) on the Edit Line. This ellipsis is VisiCalc's response to the period you typed. Type M3) to complete the expression. Press **R**.

Your screen will look like Checkpoint 21 on the following page.

### If you are hopelessly lost:

press BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP20 **R**  
continue at the top of this page

with  
cursor  
at

take this action

?  
N1  
N2  
N3

move cursor to N1  
exercise  
exercise  
type @SUM(B3

N3

type .

N3  
N3

type M3)  
press **R**

## checkpoint 21

N3 (V) @SUM(B3...M3)	C
	18

K	L	M	N
---	---	---	---

1	OCT 1980	NOV 1980	DEC 1980	YR TOTAL
2	-----	-----	-----	-----
3	23579.48	25937.42	28531.17	213842.8
4	17684.61	19453.07	21398.38	
5	-----	-----	-----	
6	5894.87	6484.36	7132.79	
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

## OVERFLOW, #, AND MORE ON FORMATTING


You'll notice that only one decimal place is displayed in the figure at N3. Try changing the format for that cell to \$ (type /F\$). N3 is now displaying " >>>>>>". This is called Overflow. If a number is too large to display in the column width available, VisiCalc displays the overflow symbols in that cell. In this case, the value is 213842.84, which is nine characters (count the decimal) if the \$ format is used. VisiCalc's normal column width is 9 characters, but when displaying numbers (values) it won't use the first character space in each cell. (If you had two 9 digit numbers side-by-side, there wouldn't be a space between them, and you would have difficulty reading the numbers).

There are two ways out of this. One is to increase the column width (see /GC on page 46). What you'll do is change the format specification to Integer. Type /FI. Under the format Integer, the value that will appear in the cell is rounded to an integer (whole number). The actual value is retained by VisiCalc and is used in calculations. The actual value can be displayed on the Edit Line by typing # (with the cursor at the particular cell of interest). Try it now. The # key is located just above the 3. To access the # key, press the SHIFT key down and hold it, type a 3.

The current value of the sum of B3 through M3 is 213842.837672. This value has been rounded to 213843 for display purposes by Format Integer. The format specifications affect only the display. Notice that the Prompt Line says "Value" and there is a cursor on the Edit Line. This should look familiar. This is what the screen looks like while you're entering an expression (formula).

with cursor at	take this action
N3	type /F\$
N3	type /FI
N3	type #

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP21   
 continue at the top of this page

You don't want to enter an expression right now, since you already have the right expression at this location. Press BREAK to erase the value on the Edit Line and the Value prompt. If you had typed **(R)** instead of BREAK, the expression on the Edit Line (213842.837672) would have replaced our "correct" expression of @SUM(B3...M3).

The importance of # is that it allows you to examine a calculated value of any expression, in General format and with a column width of 40 characters (the width of the Edit Line). After examining this value, you may either press BREAK to keep your original value intact, or you can press RETURN to have the calculated value replace the original expression. OK. Enough on that subject for now.

Time for a little skills exercise. You want to sum yearly expenses and profits, so let's replicate the formula at N3 (source) to positions N4 and also to N6 (target). Replicate down this column to complete the model. (Solution sequence on the next page.)

with cursor at	take this action
N3	press BREAK
N3	replication exercise

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP21 **(R)**  
 continue from the top of page 112



/R (R) N4 N6 (R) R R

>N5 (R) /-- (R)

The second sequence fixes N5, which shouldn't be summed. Notice that N5 still has an explicit format (/FI). It doesn't have any effect on the display, since an Integer format is meaningless with respect to labels. Just for fun, let's remove the explicit format. The only way to do it is to change the format to Default. Default is a return to whatever the Global format is for the entire matrix. So, type /FD and watch the Entry Contents Line.

Notice that when you specify a D(efault) format, it does not appear on the Entry Contents Line. The Default format will format a cell to whatever the Global format is set to. The Global format is automatically set to G(eneral) when you load VisiCalc. This means that labels are left-justified and values are right-justified.

If you change the Global format at any time, the specification for a Default format for any individual cell will then change its format to whatever the new Global format is. You should experiment with changing formats until this becomes clear.

Check your answers on the next page before proceeding.

with cursor at	take this action
N3	type key sequences on left
N5	type /FD

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP21 (R)  
continue from the top of page 112

# checkpoint 22

N5 (/ -) -	C
	18

K	L	M	N
---	---	---	---

1	OCT 1980	NOV 1980	DEC 1980	YR TOTAL
2	-----	-----	-----	-----
3	23579.48	25937.42	28531.17	213843
4	17684.61	19453.07	21398.38	160382
5	-----	-----	-----	-----
6	5894.87	6484.36	7132.79	53461
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

If you study the sample model on page 71, you'll see that we're almost done building the model. We still need to put in the name of the model (PROFIT ANALYSIS) and the "extracted" income growth rate.

Make your model look like the following page, using what you know about formatting and row insertion (see page 41). Watch the details!

If you are stuck on the problem of entering > or a blank as the first character in the label at A12, the trick is to use the " key to tell VisiCalc that the next character to be typed should be treated as a label.

with cursor at	take this action
N5	exercise

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP22 (R)  
 continue at the top of this page

# checkpoint 23

A1	C
	19

A	B	C	D
---	---	---	---

1		PROFIT AN	ALYSIS	
2				
3				
4		JAN 1980	FEB 1980	MAR 1980
5	-----	-----	-----	-----
6	INCOME	10000.00	11000.00	12100.00
7	EXPENSES	7500.00	8250.00	9075.00
8	-----	-----	-----	-----
9	PROFIT	2500.00	2750.00	3025.00
10				
11				
12	>>> GROW	TH RATE:	10	%
13				
14				
15				
16				
17				
18				
19				
20				

## DRIVING THE MODEL WITH ONE VALUE

The reason that you extracted the income growth rate and displayed it in row 12 is twofold. First, when the model is printed or viewed on the screen, it will be evident what growth rate was used in calculating the values displayed. Second, you want to be able to change the monthly income growth rate for the entire model by simply changing one number, and not having to tamper with the formulas on the INCOME row.

As you may have guessed, your next challenge is to make whatever value is at C12 actually be the growth rate used in calculations, so that when the value at C12 is changed, the values in the model change automatically. You will need to change a formula already in the model to incorporate C12.

Several solutions are presented on the following page, but you should be able to solve this on your own, now that you're a VisiWizard.

with  
cursor  
at

take this action

A1

exercise

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP23 (R)  
continue at the top of this page

All you needed to do was to change the formula at C6 to use the rate at C12, and then replicate across to M6. To set the problem up, you should note the following: First, recall that a decimal fraction is obtained by dividing growth rate by 100. Then, write out the word description of the current month's income as equal to last month's income + ((growth rate/100) x last month's income). For January, this would be 11,000 = 10,000 + (10 / 100) x 10,000. Below are several versions (although there are many other variations) of this formula expressed using the appropriate VisiCalc coordinates. Each version will work.

- 1) +B6+(B6\*(C12\*.01))
- 2) +B6\*C12/100+B6
- 3) +C12/100+1\*B6

As formula number 3 above is the simplest, we chose to use it in the solution sequence below:

>C6 (R) +C12/100+1\*B6 (R)  
/R (R) D6 M6 (R) N R

Look at several of the newly replicated formulas on row 6. What would have happened if the growth rate (C12) had been replicated using R (Relative) instead of N (No change)? If you're not sure what would happen, try it. (Be sure to fix it back to the way it was after you are done experimenting.)

Now you have a very powerful, dynamic model. We can change one value (growth rate) and see almost every other value in the model instantly change.

By the way, if you look back on page 71 you'll see that you have successfully completed the sample model that was the goal of this tutorial. Do you think you could build a simple model of your own, without help? If you can build a simple model, you can gradually make it as complex as you need. Move the cursor to C12.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP23 (R)  
continue from the top of page 118

with  
cursor  
at

take this action

A1

type key sequences  
on left

C6

experiment

C6

move cursor to C12

# checkpoint 24

C12 (V) 20		C		
		19		
A	B	C	D	
1	PROFIT ANALYSIS			
2				
3				
4	JAN 1980	FEB 1980	MAR 1980	
5	-----	-----	-----	
6	INCOME	10000.00	12000.00	14400.00
7	EXPENSES	7500.00	9000.00	10800.00
8	-----	-----	-----	
9	PROFIT	2500.00	3000.00	3600.00
10				
11				
12	>>> GROWTH RATE : 20 %			
13				
14				
15				
16				
17				
18				
19				
20				

Let's test the model. Try 20%. Type 20 Ⓜ. It works! The portion of the model visible on your screen should match page 120.

The remaining sections of this tutorial will introduce two more handy VisiCalc features, Titles and Windows, and demonstrate their use in "What If?" analyses. (Yes, you're almost done now.)

You just changed the income growth rate in the model to 20%. You then immediately saw the effects of the change on the part of the model that was visible on your screen (columns A through D). This is very nice, but if you are interested in the effect the change has on some other part of the model, you have to move the cursor to that part of the model (usually by scrolling, because it's hard to remember exactly where various items are in the model). Scroll out to the end of the model, scrolling across row 12, moving to the right.

There are two slight problems with this procedure. One, if the model had even a few more rows, it would be difficult to remember which row was which, since the labels in column A are no longer visible. Two, it is time-consuming, tedious, and breaks the flow of your thinking.

VisiCalc has two easy-to-use BIC's which will solve these problems for you. A BIC called Titles (/T) will be used to remember which row was which, and a BIC called Window (/W) will prove very useful in viewing important rows and columns no matter where you are positioned in the matrix.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP24 Ⓜ  
continue at the top of this page

with  
cursor  
at

take this action

C12

type 20 Ⓜ

C12

scroll right to N12



## FIXING TITLES IN PLACE

Move the cursor back to A1. Type /T. The Prompt Line reads "TITLES: H V B N". These subcommands are:

- H Horizontal
- V Vertical
- B Both
- N Normal (or Neither)

Type V for Vertical. The Title command has now "frozen" the vertical column that the cursor is in (column A). Column A will not move off the screen. It will not scroll either left or right, and direct cursor movement will not effect it. Let's see what this really means on the screen. Scroll to the right, across row 1, while watching the screen carefully. Scroll all the way out to column Q. You're now past the end of the model, yet column A remains frozen on the screen.

Another feature of this BIC is that not only does the column that the cursor is in become frozen, but all columns to the left of that column also freeze (using the Vertical subcommand). You can put this to good use.

Move the cursor back to A1. (Note: to move the cursor into a frozen area, scrolling will not work. You must move the cursor directly, i.e., using > .) Now your normal view of the left side of the model (columns A through D) is on the screen. Move the cursor to column B (anywhere in the column). Type /TV. Columns A and B are both frozen now. Scroll across to the right until the cursor is in column Q. Your screen should look like the following page.

with cursor at	take this action
N12 A1	move to A1 type /T
A1	type V
A1	scroll right to Q1
Q1	move cursor directly to A1
A1 B? B?	move to column B type /TV scroll right to column Q

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP24 (R)  
continue from the top of 121

# checkpoint 25

01	C
	19

A	B	N	O
---	---	---	---

1	PROFIT AN	
2		
3		
4	JAN 1980	YR TOTAL
5	-----	-----
6	INCOME	10000.00
7	EXPENSES	7500.00
8	-----	-----
9	PROFIT	2500.00
10		
11		
12	>>> GROW	TH RATE :
13		
14		
15		
16		
17		
18		
19		
20		

Just for the sake of neatness, get rid of the partial header in B1. Scroll down until row 1 scrolls off the screen.

What you have on the screen now is an example of a use of the Titles command. You have frozen the row names and initial values and juxtaposed the year totals presenting a very clear picture of this information.

Check that your screen looks like Checkpoint 26 on the following page.

OK. Now you know how to quickly Juxtapose information using titles. The next feature to apply here is the Window command, which involves splitting the screen into two "windows", each of which can display any portion of the model.

with cursor at	take this action
0?	scroll down to row 21

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP25 (R)  
 continue at the top of this page

## checkpoint 26

021	C		
	19		
	A	B	N O
2			
3			
4		JAN 1980	YR TOTAL
5	-----	-----	-----
6	INCOME	10000.00	395805
7	EXPENSES	7500.00	296854
8	-----	-----	-----
9	PROFIT	2500.00	98951
10			
11			
12	>>> GROW	TH RATE :	
13			
14			
15			
16			
17			
18			
19			
20			
21			

## USING WINDOWS

First, return the frozen titles to normal -- type /TN. Notice that the view of the model returned to what would be the normal view with the cursor in this position (021). Move the cursor back to A1 to display a full view of the beginning of the model.

A window displays some portion of the VisiCalc matrix. Windows can be either horizontal (one on top of the other) or vertical (side-by-side). For now, split the screen horizontally at row 11.

Move the cursor to row 11 (any column). Type /W . The Prompt Line displays the subcommand choices:

```
H  Horizontal split
V  Vertical split
1  One window
S  Synchronize the windows
U  Unsynchronize the windows
```

All you care about now are H and V, which split the screen into two windows, and 1, which returns the screen to normal (one window).

Type H for Horizontal. Shazam! You now have two independent windows, with the cursor in the top one. To move the cursor from one window to the other, type a semicolon (;). Type ; a few times, watching the cursor. The cursor will always jump to the last place it had been, the last time it was in that window. Try scrolling in all four directions in either window. Notice that it is possible to have the same display in both windows simultaneously. When you are satisfied that you can confidently scroll about and jump back and forth between windows, try to get your screen to look like page 127. If that's a lot of trouble, move the cursor to A1, type /W1 to go back to normal (one window), and then split it again at row 11. Move the cursor back to A1, and check your screen against the following page.

with cursor at	take this action
021	type /TN
021	move cursor to A1
A1	move cursor to row 11 type /W
?11	type H
?10	type ; experiment with jumping
?	experiment with scrolling
?	type >A1
A1	type /W1
A1	move to row 11
A11	type /WH
A11	move to A1

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP26 (R)  
continue at the top of this page

checkpoint 27

	A1			C
				19
	A	B	C	D
1		PROFIT AN	ALYSIS	
2				
3				
4		JAN 1980	FEB 1980	MAR 1980
5				
6	INCOME	10000.00	12000.00	14400.00
7	EXPENSES	7500.00	9000.00	10800.00
8				
9	PROFIT	2500.00	3000.00	3600.00
10				
	A	B	C	D
11				
12	>>> GROW	TH RATE :	20	%
13				
14				
15				
16				
17				
18				
19				

## Chapter 10: Using Your Model

With the cursor in column A, type /TV to freeze column A in place in the top window. Now scroll to the right to column P. The top window shows the row names and year totals. Type ; to jump to the bottom window. Move the cursor to C12.

Now you can really begin to use some of the power of VisiCalc. You can very conveniently begin to perform "What If?" analyses with your model. For example, the question "What would happen to the total profit for the year if the monthly income growth rate was reduced to 15%?" can be immediately and clearly answered by simply changing the value at C12. Type 15 Ⓡ. Profit went down from \$98951 to \$72504. Too bad. What if the growth rate was 22.5%? Type 22.5 Ⓡ. Profit goes wild!

Play with this feature until you don't think that it's magic anymore. Then get your screen back to the 22.5% growth picture, as shown on page 129.

with cursor at	take this action
A1 A1 P1 ?	type /TV scroll right to column P type ; move cursor to C12
C12	type 15 Ⓡ
C12	type 22.5 Ⓡ

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP27 Ⓡ  
continue at the top of this page

checkpoint 28

C12 (V) 22.5	C
	18

A	N	O	P
---	---	---	---

1				
2				
3				
4		YR TOTAL		
5	-----	-----		
6	INCOME	463072		
7	EXPENSES	347304		
8	-----	-----		
9	PROFIT	115768		
10				
	A	B	C	D
11				
12	>>> GROW	TH RATE :	22.5	%
13				
14				
15				
16				
17				
18				
19				



Monthly income growth rate is a non-relative expression. There are only two non-relative expressions in the entire model. (Nobody said this would get easier.) They are growth rate (C12) and January 1980 income (B6). It can be said that these two values "drive" the model. All of the calculated values in the model depend upon the values of these two constants.

Your last exercise is the toughest one. Create a new row just above the current row C12 and place a label and value for January 1980 income on the resulting row 12 (growth rate moves to 13). Make it look like the following page, and make the model work using this new location for January 1980 income. Try this exercise. You can do it. (Solution sequences follow the next page.)

with cursor at	take this action
C12	exercise

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP28 (R)  
 continue at the top of this page

## checkpoint 29

C12	(V)	15000		C	
				18	
	A	N	O	P	
1					
2					
3					
4		YR TOTAL			
5	-----	-----			
6	INCOME	694609			
7	EXPENSES	520957			
8	-----	-----			
9	PROFIT	173652			
10					
	A	B	C	D	
11					
12	>>> JAN.	INCOME :	15000		
13	>>> GROW	TH RATE :	22.5	%	
14					
15					
16					
17					
18					
19					

Solution to exercise:

The only trick to this exercise is to proceed in the proper order. All of your work will be in the lower window.

First, you must move growth rate to row 13 to make room for January income in row 12. Begin with the cursor at C12. Type /IR to insert a blank row. Notice that the cursor is still at C12, and all the references to the growth rate in the model have been automatically changed to C13.

Next, enter the row name and value as shown on the preceding page.

Finally, complete the following sequence slowly and thoughtfully:

>B6 (R) +C12 (R)

(Placing +C12 into B6 changes the value at B6 to +C12. Thus, whenever a new value is typed at C12, the corresponding January income at B6 is updated. Values at C12 and/or C13 drive the model).

Scroll down to line 19. Move the cursor to C12. Your screen should look like page 131.

The model is now very powerful and useful, yet it looks (and is!) very simple. Changing values at C12 or C13 or both results in immediately visible results in the upper window.

with cursor at	take this action
C12	type /IR
C12	type >A12 (R) exercise
C12	type the sequence at the left
B6	scroll down to row 19
B19	move cursor to C12

If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP28 (R)  
continue from the top of page 130

Congratulations are in order. You have successfully built a dynamic financial model. We urge you to spend some time building a new model of your own while all this knowledge is still hot.

Remember, /CY will clear the VisiCalc screen, as if you had just loaded VisiCalc. Again, note that you can recreate the model we have created here by following the recovery instructions in the box at the bottom of any text page. The tutorial diskette must be in the disk drive, and the VisiCalc screen must be clear.

The rest of this book contains additional information regarding some of the finer points of VisiCalc that were not explored in this beginning tutorial. Before continuing, you may want to try the Quiz on page 134 to test your knowledge.

with  
cursor  
at

take this action

If you are hopelessly lost:

## QUIZ SIX

- 1) What would appear on the Edit Line after typing # with the cursor positioned at a blank cell?
- 2) Which BIC would change the default for the Global format to right-justified?  
(a) /FR      (b) /GFDR      (c) /GFR      (d) /FGR
- 3) With the cursor at A1, the BIC /TB will have the effect of:  
(a) Freezing cell A1 only.  
(b) Freezing column A only.  
(c) Freezing row 1 only.  
(d) Freezing both column A and row 1.
- 4) Assuming that (d) is the answer to #3 above (did you think so?), the only way to access column A and row 1 is to:  
(a) Use the arrow keys.  
(b) Use the Go to command.  
(c) Use the Go to command or the @ key.  
(d) Plead and/or compromise with VisiCalc.
- 5) A calculation resulting in overflow (" >>>>>>") always indicates:  
(a) The calculation was beyond the computer's capacity.  
(b) The result was too large to display with the current column width.  
(c) The calculation produced an ERROR.  
(d) The formula contained too many variables.
- 6) If a screen is divided into two windows, changing a term in one of the windows will have the effect of:  
(a) Producing an error.  
(b) Changing the term in only one window.  
(c) No effect at all.  
(d) Changing the term in both windows.

Turn this page upside down to view the solutions.

1. 0, 2. c, 3. d, 4. b, 5. b, 6. d

### PART III: ADVANCED TUTORIAL

#### Chapter 11: More Built-In Functions

You have already learned how to build a financial model.

In this Part you will practice using the table Lookup functions, and the Net Present Value (@NPV) function which allow you to make your models even more flexible and powerful.

Next, you will learn a little about the functions, commands and miscellaneous procedures you will use at some time in your use of VisiCalc. You will learn the basics of storing, retrieving and printing your models. A further reading list is also provided to point out the most important parts of your ATARI manuals.

At the end of the Advanced Tutorial you will learn how some practical Applications are constructed. This will include methods to make data entry easier, methods to check for the presence of data, and other useful tips on building VisiCalc models. We will call a model, once completed and ready to use, an Application.

Now let's learn about VisiCalc's more advanced functions. Remember you can use the Checkpoint feature to review sections as needed. The advanced functions are built into VisiCalc just as the simpler functions were. The advanced functions are more versatile, and therefore are somewhat more difficult to understand in the beginning. Don't worry if you are still confused about their use at first. The use and versatility of the more advanced functions will become apparent as you begin to use them. Begin with the table Lookup functions.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of page 136

with  
cursor  
at

take this action

VisiCalc makes available to you some more advanced functions to help you construct your models. You will be introduced to the @LOOKUP and @NPV functions.

The @LOOKUP function makes it easy to create and use tables in your VisiCalc matrix. The @NPV function makes discounting cash flows easy. Make sure your screen is cleared for action.

Type /CY.

THE @LOOKUP FUNCTION

The @LOOKUP function lets you lookup a value in a table. The table has reference amounts and corresponding return values. If these are listed in column form, the reference amounts are placed to the left of the return values. The reference amounts should be placed directly above the return values if they are listed in a row. Keypoint page 139 shows you the details.

When you give @LOOKUP any entry reference value, it looks at each table reference amount until it finds the one which is the "right" one. Then it transfers the corresponding return value associated with that reference amount to the @LOOKUP function.

The "right" reference amount is found by starting at the beginning of the table and continuing to compare the entry reference value with each table reference amount until one is found that is larger (or until you reach the end of the table). It then "backs-up" one entry and retrieves the corresponding return value. Now try it out.

If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue at the top of this page

with cursor at	take this action
?	type /CY

Type /SL, then type CP30 (R). Look at your screen. It should look like page 138.

The Entry Contents Line shows you how the commission % rate is obtained. It displays the contents of cell C7 as "@LOOKUP(C4,A15...A19)". What does this mean?

The first argument is C4 (the monthly sales), which has a current value of 45000. This is the table entry reference value. A15...A19 is the specification of the cells containing the table's reference amounts. It is telling you that cells A15, A16, A17, A18, and A19 contain the reference amounts. Since these reference amounts are in a column, the table's return values are assumed to be just to the right of these reference amounts. What is in cells B15 through (...) B19?

You're right! It holds the salesperson's commission % rate.

Let's step through the @LOOKUP process. First, the entry reference value of 45000 is compared to the first table reference amount of 0 stored in cell A15. Since 45000 is greater than 0 it checks cell A16. What's the outcome? That's right. 45000 is greater than 12500, so VisiCalc continues to look. It finally reaches cell A19 which contains 50000. Since 50000 is bigger than 45000, @LOOKUP has reached the end of its search. @LOOKUP backs up one to the table row containing 37500 as the reference and 4% as the commission rate. @LOOKUP(C4,A15...A19) has a value of 4, as you can see displayed in cell C7.

Move to C4. Type 13000. Before you press (R), think about what the @LOOKUP function will evaluate to. Press (R). Look at cell C7.

It holds a 2. Is this what you expected? Enter some more values into cell C4 and watch how @LOOKUP works. This function will come in very handy when you start to build your own models.

### If you are hopelessly lost:

press BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

with cursor at	take this action
A1	type /SLCP30 (R)
C7	type >C4 press (R)
C4	type 13000 press (R)
C4	type several values



# checkpoint 30

	C7	(V)	@LOOKUP(C4,A15...A19)	C
				20
	A	B	C	D
1	SALESPERS	ON COMPEN	SATION RE	PORT
2				
3	ANNUAL GO	AL.....\$	600000	
4	MONTHLY S	ALES...\$	45000	
5	YTD SALES	.....\$	650000	
6				
7	COMMISSIO	N % RATE	4	
8				
9	COMMISSIO	N DUE...\$	1800	
10	BASE AMOU	NT DUE..\$	1500	
11	TOTAL AMO	UNT DUE.\$	3300	
12				
13	MONTHLY \$	%	BASE \$	
14	-----	-----	-----	
15	0	1	500	
16	12500	2	500	
17	25000	3	1000	
18	37500	4	1500	
19	50000	5	2000	
20				

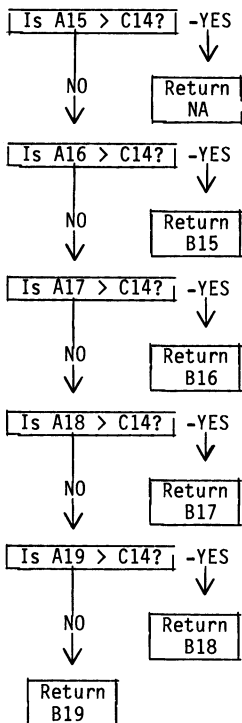
# keypoint

## @LOOKUP FUNCTION

range of table lookups

@LOOKUP(C14, A15...A19)

Argument



	A	B	C
14			45000
15	0	1	
16	12500	2	
17	25000	3	
18	37500	4	
19	50000	5	

Reference  
Amounts

Corresponding  
Return Values

Entry  
Reference  
Value

Use the flow chart and table to follow through this example. The coordinates describing the location of the table in the matrix are indicated above by A15...A19. The reference amounts at each of these cells (0, 12500, ..., 50000) are successively compared to the entry reference value at C14 (45000). When the reference amount in the search table is greater than the entry reference value, the corresponding return value from the previous reference amount (in this case the value 4 at cell B18) is returned. In the flow chart above, NO would be answered to all but the last question. Since the condition A19 > C14 is TRUE, the value at B18 (i.e., 4) would be returned.

Now replace the previous value of 45000 in cell C4.

A final example of the @LOOKUP function is used in the Salesperson Compensation Report. Move your cursor to C10. You see that the base amount due is also calculated using the @LOOKUP function and the lookup table. In this case, the argument is C7 -- the number we just calculated using the @LOOKUP function. Now that we know the salesman's commission % rate, we can go back to the table and determine the base amount due.

Notice that the value at C7 is 4. Look at the column B15...B19. The base amount due can be found from the commission % rate and the @LOOKUP function helps us do this. You should see that the value 1500 is directly to the right of 4 in the table, which is why the @LOOKUP function returned this value to C10.

Now move to C7 and enter a value of 5 while watching the value at C10 change from 1500 to 2000. Try entering all the values from 1 to 5 and pay attention to the results of the @LOOKUP function in cell C10. When you are through, type /CY to clear your screen.

with cursor at	take this action
C4	enter 45000
C4	move to C10
C10 C7	move to C7 exercise
C7	type /CY

**If you are hopelessly lost:**

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from the top of page 137

## THE @NPV FUNCTION

@NPV stands for Net Present Value. If you are not familiar with this phrase, read the rest of this page. Otherwise, turn to page 142.

Present Value is a concept involving the time value of money. Suppose you were asked to trade \$1000 today for a guaranteed \$1100 one year from today. Would you do it?

The \$100 difference represents the "interest" offered, which is 10%. The trade is only attractive if you can't make more than 10% somewhere else.

Thus, any promise of cash in the future can be "discounted" by an interest rate you require in order to compare between offers. The process of discounting future cash to its present value is done automatically by VisiCalc when you use the @NPV function. Let's see how it works.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

with  
cursor  
at

take this action

Type /SL. Then type CP31 and press **(R)**. Look at your screen. It should look like page 143.

This example will calculate the present value of up to 5 years of future cash flows according to a discount interest rate you enter at A10.

The \$1100 promised in one year has been entered at A14. As it shows at B6, the present value of this \$1100 one year from today is \$1000, if you discount it using a 10% interest rate (i). You can verify this using the formula below:

$$\text{Present Value} = \text{Sum at the end of the year} / (1 + i/100)$$

Since we know the sum is \$1100, we can find the Present Value by dividing \$1100 by  $(1 + (i/100))$ :

$$\text{Present Value} = 1100 / (1 + (10/100)) = 1100/1.1 = 1000$$

Of course, VisiCalc performed this automatically.

Enter 20. Look at B6 on your screen.

What happened? At a 20% discount rate, the \$1100 one year from now has a present value of only \$916.67. Verify that this is so.

The opposite of NPV is the compounding of money. Suppose you have 100 and the interest rate you obtain is 10%. Then,  $100 (1 + .10)^1 = 110$ .

This is your new bank balance at the end of the year. What if you left the money in the bank for another year? Then,  $100 (1 + .10)^2$  (nd year) = 121, or  $110 (1 + .10)^1 = 121$ .

This second expression is a good example of a compounding formula. In general  $(1 + i)^n$  gives the compound interest factor for n (corresponding periods) years at i (interest per compounding period). Applications later in this part of the tutorial will let you see some uses of the compounding formula. For now, type /CY to clear the screen.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

with  
cursor  
at

A1

A10

A10

take this action

type /SLCP31  
press **(R)**

enter 20

type /CY

## checkpoint 31

A10 (V) 10	C
	20

A horizontal number line with four tick marks. The segments between the tick marks are labeled A, B, C, and D from left to right. A dashed line is drawn above the number line.

1	ANALYSIS	OF CASH F	LOWS FROM
2		AN INVEST	MENT
3			
4	PRESENT V	ALUE	
5	OF CASH F	LOWS	
6	IS ---->\$	1000.00	
7			
8	AT THE DI	SCOUNT	
9	INTEREST	RATE OF	
10	<div style="border: 1px solid black; padding: 2px;">10</div>	%<-----	
11			
12			
13	CASH FLOW	OF RETURN	S
14	1100	<-----	YEAR 1
15	0	<-----	YEAR 2
16	0	<-----	YEAR 3
17	0	<-----	YEAR 4
18	0	<-----	YEAR 5
19			
20			

Let's look at a more expanded use of @NPV. Type /SL. Then type CP32 and press **Ⓡ**. Look at your screen. It should look like page 145.

Look at the Entry Contents Line. It should display "@NPV(A10/100,A14...A18)". What does this mean? The first argument (A10/100) is the discount interest rate. Note that the percentage in cell A10 has been converted to a fraction representing the discount interest rate. Next is the range of cash flows you wish to discount. In this example, each of the values in cells A14, A15, A16, A17, and A18 will be discounted to a present value. When this is done, A14 is assumed to occur after one interest period (in this case 1 year), A15 after two interest periods, and so on. After each separate cash flow is discounted to its present value, they are summed together. The result is the value \$15793.47 appearing at coordinate C6.

with cursor at	take this action
A1	type/SLCP32 press <b>Ⓡ</b>

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue at the top of this page

## checkpoint 32

C6 /F\$ (V) @NPV(A10/100,A14...A18) C
20

	A	B	C	D
1	ANALYSIS	OF CASH F	LOWS FROM	
2	AN	INVESTMEN	T	
3				
4	PRESENT V	ALUE OF R	ETURN	
5	CASH FLOW	S AFTER I	NITIAL	
6	INVESTMEN	T IS -->\$	15793.47	
7				
8	AT THE TA	RGET		
9	RETURN RA	TE BELOW		
10	20	%<-----		
11	INITIAL I	NVESTMENT		
12	15000	<-----		
13	CASH FLO	W OF RETU	RNS	
14	2000	<-----	YEAR 1	
15	4000	<-----	YEAR 2	
16	6000	<-----	YEAR 3	
17	8000	<-----	YEAR 4	
18	10000	<-----	YEAR 5	
19				
20				



## SUMMARY

In this section you have been introduced to some of the advanced functions available in VisiCalc.

The functions you were introduced to are very powerful. The @LOOKUP function provides you the tables you'll need for looking up prices or parts, sales tax rates for various states, volume discounts and a myriad of other applications. Of course, if you evaluate investment alternatives, you will find lots of ways to use the @NPV function in your models.

## COMING ATTRACTIONS

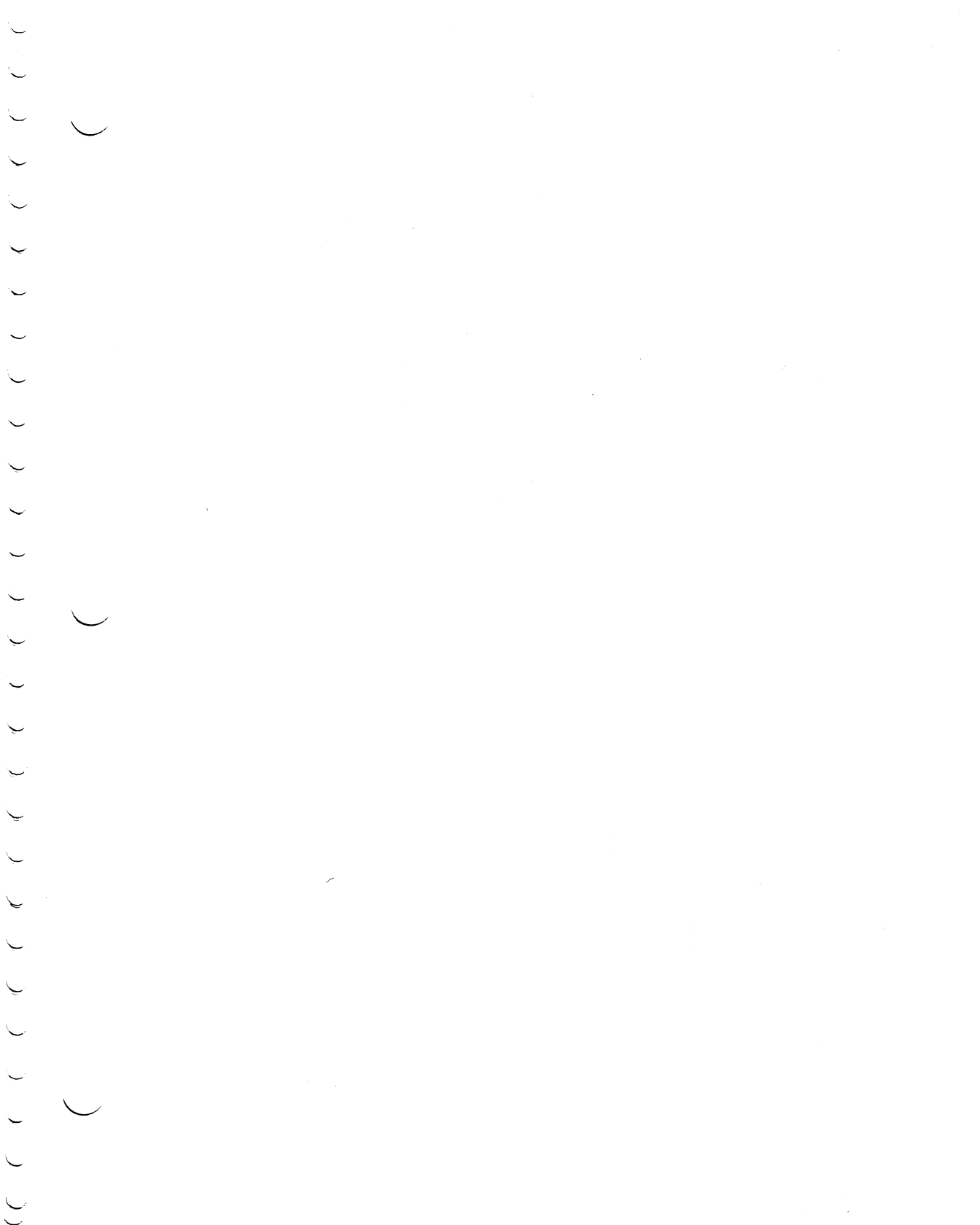
Although there are a few additional Built-In Functions that have not been covered (see page 153), you now have a good basis to do your own VisiCalc programming. The next Chapter discusses these additional features and, more importantly, gives you an introduction to storing, retrieving, and printing your VisiCalc models. Turn the page to begin.

with  
cursor  
at

take this action

### If you are hopelessly lost:

try Chapter 11 again  
(it covered a lot of ground)  
continue from the top of page 135



## Chapter 12: More on Commands & Misc. Procedures

In this Chapter you will be introduced to the VisiCalc capabilities which allow you to store, retrieve, and print the results of your models. Although these are extremely important aspects of VisiCalc to learn, you will have to supplement this tutorial by reading parts of the manuals supplied with your ATARI computer. It is recommended that you first read these tutorial sections and then read the referenced manuals.

### STORAGE OF VISICALC MODELS

There are a few more useful procedures and Built-In Commands that will be helpful to you. You may have noticed the chart of VisiCalc commands on the inside cover of this book. This chart is a quick-reference card similar to the one for the Built-In Functions, and presents an overview of the BIC's and their subcommands. Thus far, we have introduced the following commands:

/B  
/C  
/D  
/F  
/G  
/I  
/R  
/S  
/T  
/V  
/W  
/-

To save a VisiCalc model on a diskette, the procedure is:

- 1) insert initialized diskette
- 2) type /SS
- 3) type name to assign to the file
- 4) press (R)

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
continue from "Storage of VisiCalc Models" above

with  
cursor  
at

take this action

However, before using this command you must prepare blank diskettes for use in storing VisiCalc models. This is accomplished by using the Disk Operating System FORMAT command. Read pages 10 through 12 in the Disk Operating System Guide provided with your ATARI computer.

A blank diskette can also be formatted under VisiCalc. The procedure is:

- 1) insert the blank diskette
- 2) type /S
- 3) type I
- 4) press (R)

To load a VisiCalc model onto your screen from a diskette, the procedure is:

- 1) insert diskette containing the desired model
- 2) type /CY
- 3) type /SL
- 4) type name of the file to be loaded
- 5) press (R)

Note that you have used the load procedure throughout this text to load Checkpoints. The tutorial diskette that accompanies this book contains a set of VisiCalc models that have been saved with names like CP3, using the /SS command.

For more detailed information, read the following pages in the VisiCalc guide that came with your VisiCalc package:

<u>Section</u>	<u>Topic</u>	<u>Pages</u>
Reference	Storage Command	149 thru 156

and the following pages in your Disk Operating System manual:

If you are hopelessly lost:

with  
cursor  
at

take this action

<u>Section</u>	<u>Topic</u>	<u>Pages</u>
Chapter 1	Getting Started with DOS	1 thru 7
Chapter 3	How to Format a Diskette	10 thru 12

As an exercise: 1) take a new diskette and format it using the DOS FORMAT command; 2) load VisiCalc; 3) load an example from your tutorial diskette; and 4) save the example on your newly formatted diskette. Remember to replace your tutorial diskette in the disk drive after you have completed the exercise.

#### PRINTING VISICALC MODELS

VisiCalc has another important Built-In Command which prints out your model's results. It is slightly more complex than most of the others because there are many different printers and printer interfaces. You should read pages 135 through 138 of your ATARI VisiCalc Guide to find the proper use of the P(rint) command on your system.

However, a few tips on printing at this point may be useful to you.

First, the Print command prints a rectangular area of the model's displayed results in the VisiCalc matrix.

As is shown on Keypoint page 152, you can specify a rectangle by stating its upper left-hand cell's coordinates, and its lower right-hand cell's coordinates. The rectangle you specify will be printed out row-by-row. You must be careful to observe a few rules:

**If you are hopelessly lost:**

- 1) Make sure the width of the rectangle is not wider than the printer can handle. Printers usually print 40, 80, 120 or 132 characters per line.
- 2) Make sure that the length of the rectangle is not too long for the page. If it is, the report may spill over or try to print on a perforation.

By planning in advance, you can lay out your model in the matrix in blocks of information which go together and can fit on a page of the size your printer can handle.

Another important aspect of the Print command is that it prints only the results of your model's calculations as displayed on your screen. It will not print out the actual contents of the cells (you would use the /S command to do this).

The general sequence for printing with your ATARI computer is as follows:

- ° Make a note of the upper left and lower right coordinates of the area to print (e.g., A1, H12).
- ° Turn on your printer.
- ° Position the cursor on the upper left-hand cell (e.g., >A1).
- ° Type /P and the Prompt Line will ask you for P(rinter) or F(ile).
- ° Type P and the Prompt Line will say 'Print: Lower Right,"Setup,+,-,&'
- ° Type the coordinate of the lower right-hand cell and press Ⓜ (e.g., H12 Ⓜ).

If you don't wish to continue printing after the printer starts, you can press the BREAK key to stop.

with  
cursor  
at

take this action

If you are hopelessly lost:

# keypoint

## GUIDE FOR PRINTING THIS MATRIX

	A	B	C	D	E	F	G	H	I	J	K					
1.	A1 <--UPPER LEFT			TITLE AND												
2.				HEADINGS												
3.							} PRINT AREA 1: A1, H12									
4.																
5.																
6.																
7.												<----- DATA ENTRY SECTION ----->				
8.																
9.																
10.																
11.																
12.							LOWER RIGHT--> H12									
13.							A13 <--UPPER LEFT									
14.	HEADINGS			} PRINT AREA 2: A13, E27												
15.																
16.																
17.																
18.																
19.																
20.																
21.																
22.												<----- REPORT SECTION ----->				
23.																
24.																
25.																
26.																
27.	LOWER RIGHT--> E27															
	A	B	C	D	E	F	G	H	I	J	K					

Assuming that we are using an 80 column printer and a VisiCalc Global Column width of 9, the best way to print the above matrix is as follows:

- 1) Print the Data Entry Section and the Report Section in two separate portions for readability.
- 2) Use the coordinates A1 and H12 to print the Data Entry Section.
- 3) Use the coordinates A13 and E27 to print the Report Section.

If you are not using a standard ATARI 820 or 825 printer, you may need to enter a Setup string, or type + to send a carriage return, or type - to turn off line feeds, or type & to send a line feed with each carriage return to control your printer. Read pages 135 through 138 in your ATARI VisiCalc Guide provided with your VisiCalc software.

To try this out, load any Checkpoint or Application from your tutorial diskette and print out the section which appears on your screen (A1 is the upper left and D20 is the lower right).

MISCELLANEOUS BUILT-IN FUNCTIONS

There are a few more of the 22 Built-In Functions that will be helpful to you. Thus far, you have been introduced to:

- |          |         |
|----------|---------|
| @SUM     | @NA     |
| @COUNT   | @ERROR  |
| @MIN     | @LOOKUP |
| @MAX     | @NPV    |
| @AVERAGE |         |

The following is a list of the remaining Built-In Functions:

- |        |       |
|--------|-------|
| @LOG10 | @ACOS |
| @LN    | @INT  |
| @EXP   | @ABS  |
| @SQRT  | @PI   |
| @TAN   | @COS  |
| @ATAN  | @SIN  |
| @ASIN  |       |

If you are hopelessly lost:

with cursor at	take this action



Some of these are used in the Application models in the last Chapter of this book.

Read the following sections of your ATARI VisiCalc Guide to see how these work:

<u>Section</u>	<u>Topic</u>	<u>Pages</u>
Tutorial	Lesson 4	80 thru 87
Command Reference	Functions with Arguments and Functions with- out Arguments	106 thru 108

with  
cursor  
at

take this action

If you are hopelessly lost:

## MISCELLANEOUS COMMANDS & PROCEDURES

/F This command is used to format the display of a particular cell. Subcommand \* allows you to create graphic displays. To learn about all of the options, read page 58 and 114-117 in your ATARI VisiCalc Guide for an explanation of its use.

/G This command is used to perform operations on the entire model (Global operations). As you recall, subcommand C allows you to change the column width of all the columns in the window. The width must be between 3 and 37. The procedure is:

- 1) type /GC
- 2) type column width desired
- 3) press **R**

You have also used subcommand F, which allows you to set formats for the entire model. The list of format choices is the same as the list used in the /F command. This Global format affects only those cells that do not have an explicit format specification.

Read pages 118 through 123 in your ATARI VisiCalc Guide to learn about the /GO subcommand, which controls the Order of VisiCalc's calculations, and the /GR subcommand, which controls the recalculation feature of VisiCalc. For example, typing /GRM tells VisiCalc to recalculate only when you Manually type ! (hold the SHIFT key down and type 1). This is very useful in situations where you don't want to wait for recalculations between each data entry step.

If you are hopelessly lost:

with  
cursor  
at

take this action

/W

The Window command has two subcommands that we have not yet discussed -- S and U. S stands for Synchronized scrolling. It causes the contents of the two windows to scroll together, i.e., when one scrolls, they both scroll. U stands for Unsynchronized scrolling. U shuts off S, that is, returns to normal, single-window scrolling.

#### FURTHER READING

To round out your understanding of VisiCalc, we recommend that you read the following pages of the VisiCalc Guide provided with your VisiCalc program:

<u>Section</u>	<u>Topic</u>	<u>Pages</u>
Command Reference	The VisiCalc Screen	93-98
	The @NA and @ERROR Functions	107
	Scientific Notation	101
	More on Formulas	102 thru 103
	More on Built-In Functions	106 thru 108
	Manual and Automatic Recalculation	122
	The VALUE ENTRY Command	101 thru 108

If you are hopelessly lost:

with  
cursor  
at

take this action

A -- Controlling 135 thru  
the Printer 138

and the following pages of the Disk Operating  
System manual that came with your computer:

<u>Section</u>	<u>Topic</u>	<u>Pages</u>
Getting Started with DOS	Write Protecting Your Diskettes	14 thru 15
Using DOSII	If Your Computer is Already On	19 thru 22

#### SUMMARY

Congratulations!

You have learned how to make VisiCalc an assistant  
to you in your work by replacing tedious calcula-  
tions with models and data. You can:

- ° Build a financial model.
- ° Store the model on a diskette.
- ° Reload the model from a diskette to add more  
data or make changes.
- ° Print out the final results of the model for  
use in reports.

#### COMING ATTRACTIONS

The next Chapter contains 5 completed VisiCalc  
Applications which you can try out. Each one  
should be useful to you as a real tool, and each  
one is designed to show you some more VisiCalc  
programming methods. Have fun!

If you are hopelessly lost:

with  
cursor  
at

take this action

## Chapter 13: VisiCalc Applications You Can Use

In this Chapter the following 5 VisiCalc Applications are introduced:

- 1). Personal Activity Analysis
- 2). Your Very Own Deal Analyzer
- 3). Portfolio Valuation
- 4). Nestegg Projection
- 5). Loan Repayment Schedule

You will load each one into the VisiCalc matrix and try it out. In addition, you will be given a guided tour of the model's design to allow you to see various VisiCalc programming techniques in use.

In order to use the full potential of VisiCalc, you will soon be building your own models. These five Applications will teach you some fundamental principles about model building. Additionally, these Applications are templates that you can use and re-use after completing this tutorial simply by loading them into your VisiCalc matrix. Once loaded, you can enter your own data into the models and perform many different calculations. Each Application has instructions on the screen so that you can use the model without this text.

However, for your first tour through the Applications it will be easier to follow the instructions in the text rather than those on the screen. So, as you walk through the Applications you need only note the screen instructions for future reference. Begin on the following page.

with cursor at	take this action

**If you are hopelessly lost:**

## PERSONAL ACTIVITY ANALYSIS

The Personal Activity Analysis is an Application of VisiCalc which enables the user to keep track of daily activities during any month. To load the Personal Activity Analysis Application, type /CY. Type /SL, then specify the file by typing CP33. Press **(R)**. It will take about 30 seconds before the cursor appears at position A13, which is where you will begin entering activity labels.

If you look at Keypoint pages 160-162, you will see a printed version of what the Personal Activity Analysis will look like after you complete this example. There are instructions included with the Application, but they do not appear on the report. At times during this example you may want to refer back to these Keypoint pages. This will give you a better understanding of exactly where you are on the VisiCalc matrix, and a broader perspective of the entire Application.

Now, let's look at some instructions contained in the Application so you know where to find them whenever you use this Application on your own. Type >A88. (Remember to press the RETURN key after each Go to command.)

with cursor at	take this action
?	type /CY
A1	type /SLCP33 press <b>(R)</b>
A13	type >A88 <b>(R)</b>

### If you are hopelessly lost:

press the BREAK key to clear the Prompt line  
continue at the top of this page

keypoint

NAME: MUSIC \$  
MONTH: OCTOBER  
YEAR: 1982

PERSONAL ACTIVITY ANALYSIS

\*\*\*\*\*  
FOR INSTRUCTIONS  
TYPE: >ABB  
\*\*\*\*\*

	D A Y O F T H E M O N T H											
ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Merle March	2.00		2.00					2.00		2.00		
Wendy Waltz		1.50			1.50				1.50			1.50
Stephen Stanza	3.00							3.00				
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												
13.												
14.												
15.												
TOTALS	5.00	1.50	2.00	0.00	1.50	0.00	0.00	5.00	1.50	2.00	0.00	1.50

# keypoint

13	14	15	16	17	18	19	20	21	22	23	24	25	26
		2.00		2.00					2.00		2.00		
		3.00	1.50			1.50				1.50			1.50
									3.00				
0.00	0.00	5.00	1.50	2.00	0.00	1.50	0.00	0.00	5.00	1.50	2.00	0.00	1.50



keypoint

							DIFFERENCE		EXTENSION		% OF TOTAL	
27	28	29	30	31	TOTAL	% OF TOTAL	GOAL LEVEL	FROM GOAL	% OF FACTOR GOAL	EXTENDED AMOUNT	EXTENDED AMOUNT	% OF TOTAL
					20.00	41.24	15.00	5.00	133.33	14.00	280.00	41.24
					13.50	27.84	15.00	-1.50	90.00	14.00	189.00	27.84
					15.00	30.93	15.00	0.00	100.00	14.00	210.00	30.93
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
0.00	0.00	5.00	1.50	2.00	48.50	100	45.00	3.50	107.78	679.00	100	

## HOW TO USE THIS APPLICATION

Look at your screen. Notice that the first 12 rows still remain at the top of your screen even though the cursor is on row 88. That is because there has been a horizontal title fixed at row 12. There has also been a vertical title fixed on column B. Columns A and B hold "Activity" names and will appear on your screen throughout the exercise.

The instructions for this Application begin at row 81. To read the entire block of instructions, use the CTRL key and down arrow key to scroll downwards. For now, read through all or as many of the instructions as you like, and then return the cursor to A13.

Now we are ready to begin constructing an example. The screen is exactly the same as it was before you looked at the instructions. Suppose a music teacher wants to keep a file of the income generated by giving lessons for one month. Under "Activity", he would like to enter his students' names. At this point he has 3 students. Their names are Merle March, Wendy Waltz, and Stephen Stanza. Enter their names under "Activity" in rows 13, 14 and 15. Remember, you can only use a maximum of 9 characters in each cell, so use the arrow keys to position the cursor correctly to enter the entire name.

Notice that the Activity numbers 1., 2., and 3. were replaced by the names you entered. These numbers were only entered as labels in cells A13, A14, and A15. You could have retyped them in your label as well.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue at the top of page 159

with cursor at	take this action
A88	scroll down, reading instructions
?	type >A13 (R)
A13	type Merle Mar move cursor to B13
B13	type ch move to A14
A14	begin typing Wendy Waltz, scroll cursor when appropriate, enter Stephen Stanza in row 15
B15	

The next thing the music teacher needs to enter is the length of time each student will be in his office and the appropriate day for each lesson. The dates of the month (1 through 31) appear on row 11.

Merle March has arranged to have 2 lessons a week for 2 hours each, starting at the 1st and 3rd of the month. Therefore, a 2 must be entered in each appropriate cell, starting at C13. A 2 would then be entered under the dates:

1st, 3rd, 8th, 10th, 15th, 17th, 22nd, 24th, 29th, and 31st

If you have finished entering a 2 for the 31st of the month, your cursor's position should be AG13. Right? Good, now scroll the worksheet once more by pressing the right arrow key. You have reached the beginning of the results section of the worksheet. The TOTAL column calculates each activity's total for the entire month. At the bottom of this column all activity totals are summed to get a final total.

You may be wondering why Merle March's total is still 0.00 after you entered all the 2's. It's because the recalculation option in VisiCalc has been set to Manual instead of Automatic using the /GRM command (see page 85). Thus, the "!" must be typed for each new recalculation.

with  
cursor  
at

take this action

B15  
C13

move cursor to C13  
type 2 (R) (the (R)  
is optional ex-  
cept for final  
cell), scroll cursor  
to E13, continue  
entering the value  
2 under appropri-  
ate dates

AG13

move cursor to AH13

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 159

## checkpoint 33

A13 (L) 1.		C	
		04	
	A	B	C
	D		
1	NAME:		
2	MONTH:		
3	YEAR:		PERSONAL
4			
5	*****	*****	
6	FOR INS	TRUCTIONS	
7	TYPE:	>A88	
8	*****	*****	
9		!	
10		!	D A Y
11	ACTIVITY	!	1 2
12	-----	-----	-----
13	1.		
14	2.		
15	3.		
16	4.		
17	5.		
18	6.		
19	7.		
20	8.		

Type ! and watch the total of Merle's hours be calculated. Notice the ! in the upper right corner of the screen indicating calculations are being performed.

Let's include the hours for the other 2 students. Move the cursor back to the beginning of the month.

Wendy Waltz has also arranged 2 lessons a week but for only an hour and a half each. She will begin on the 2nd and 5th of the month.

Move the cursor to the 2nd of the month. Type 1.5 and scroll the cursor to the 5th of the month (G14).

Type 1.5 and continue entering this value on the 9th, 12th, 16th, 19th, 23rd, 26th, and 30th. (Remember to press the RETURN key to enter the last value.)

Let's finally enter Stephen Stanza's lessons. He has agreed to meet with the music teacher once a week for 3 hours. The first of these long lessons is on the 1st of the month. So move the cursor to C15 and begin entering Stephen's time every seven days.

The final entry for Stephen is on the 29th, which is cell AE15. Scroll over to the TOTAL column and perform a recalculation.

Now we are ready to see some of the usefulness of the Personal Activity Analysis.

Scroll right once and examine the next column. It's heading reads: "% OF TOTAL". There is a small inconvenience associated with this calculation. When you first loaded this Application there were no input values for any of the activities, so all the sums in the TOTAL column were 0.00. That included AH30, which is the sum of all the activity totals.

with cursor at	take this action
AH13	type !
AH13	type >A14 Ⓡ
A14 D14	type >D14 Ⓡ enter 1.5 move to G14
G14	enter 1.5 continue to enter 1.5 under remaining appropriate dates
AF14 C15	type >C15 Ⓡ type 3, move cursor to J15, type 3, continue for every 7th day until the 29th (AE15).
AE15 AH15	move cursor to AH15 type !
AH15	move cursor to A115

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 159

When the Application is loaded, VisiCalc will try to perform the division necessary to calculate this percent of total. But woe to the unfortunates who try to divide by zero.

Clearly, this percent formula must protect itself against the possibility of dividing by zero. Use of the @MAX function provides relief from this problem.

Make sure your cursor is at cell AI15. Observe the formula on the Entry Contents Line. To calculate the % OF TOTAL we must divide each TOTAL by the sum of all the TOTALS. To avoid the possibility of division by zero we use @MAX(AH30,.01) as the denominator instead of just AH30. In this way, a positive value will always appear in the denominator and the division will not produce an error.

It might be helpful to note here that the possibility of a negative activity total (the numerator of this division) has not been accounted for in this formula. Such a value would put a considerable dent in the veracity of our calculations. A similar application of the @MAX function would provide protection against this error, but would also increase the amount of memory needed to load the worksheet, as well as the amount of time needed for each calculation.

This trade-off seemed to favor omitting the protection, with a note of warning: avoid using negative values.

Let's continue with our example and examine the rest of the result section. Scroll the sheet once more to the right. We are now in the GOAL LEVEL column. This is where the music teacher will enter the number of hours he expects to teach a student each month.

with  
cursor  
at

take this action

AI15

look at Entry  
Contents Line,  
observe use of  
the @MAX  
function

AI15

scroll to AJ15

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 159

He decides that 15 hours a month would be a satisfying amount (for both instructive and financial reasons) for all 3 students. Move the cursor to AJ13 and enter the value 15. Now use the Replicate command to copy a GOAL LEVEL of 15 for Wendy and Stephen. Good. Scroll the sheet to the right once more.

The column you are now in calculates the difference from the goal. Look at these results. If you remember the totals from column AH you may wonder why these results look so strange. That's right! It's because you haven't told VisiCalc to perform another recalculation. Time to type another !. That looks better.

Notice that Wendy Waltz's difference is a negative number because her actual total is 1.5 hours below the teacher's goal. Stephen Stanza's difference from the goal equals zero since he has arranged lessons for the same number of hours per month as his teacher expected. Scroll the sheet to the right once more.

You see that the percent of the goal has been calculated for you. It appears that Merle really intends to apply himself to his music study. The number of hours he has committed himself to have surpassed even his teacher's expectations! By looking at the Entry Contents Line you'll see that protection against division by zero has again been provided. Now scroll to AN13 to see two new columns, then back once to column AM.

The EXTENSION FACTOR will be the music teacher's wage per hour. The Application is loaded into memory with a value of 1 in this column. This is to try to treat a general case for the Application, but may often be changed by the user -- which is what we are going to do now.

Since the days of \$1.00/hr. wages have passed, the music teacher must enter his current wage of \$14.00/hr. Enter 14 in AM13, AM14, and AM15 using either the Replicate command or by just moving the cursor. Remember to recalculate after these values have been entered.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 159

with cursor at	take this action
AJ15 AJ13	move to AJ13 enter 15 type /R <sup>Ⓡ</sup> AJ14 AJ15 <sup>Ⓡ</sup> scroll right once
AK13	type !
AK13	press CTRL key and -->
AL13 AN13	move to AN13 press CTRL key and <--
AM13	enter 14 in AM13...AM15
AM?	type !

After typing "!", you'll see the values in the EXTENDED AMOUNT column change to their new correct values of 280.00, 189.00 and 210.00 for Merle, Wendy and Stephen respectively. This column represents the income the music teacher will earn from each student in one month. Let's look at the last column. Type >A013.

The percent of the TOTAL EXTENDED AMOUNT is calculated with the same protection as the two previous percents.

Finally, let's look at some more totals. Type >A030. In the column to the left you see the music teacher's total income from his lessons for that month, the TOTAL EXTENDED AMOUNT OF \$679.00. Naturally, the sum of the percentages of each student's contribution to their instructor's income is 100%.

You can now scroll back across the worksheet and note that totals for each column have been calculated all along. How nice! The only exception is the EXTENSION FACTOR column, where a total sum would not have any great significance.

with cursor at	take this action
AM?	move to A013
A013	move to A030
A030	holding CTRL key and pressing <--, scroll back to C30

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 159



## HOW DOES THIS WORK?

Keypoint page 171 illustrates how the Visicalc matrix has been used. This area has been divided into 6 rectangular areas: 1) A group of rows (81-125) extending from column A thru D which contain instructions, 2) A large group of rows for holding a month's worth of activity data (rows 13-27, from column C thru AG), 3) A corresponding two-column area (rows 13-27) of fixed titles which hold the names of the activities, 4) An area for holding activity totals and associated calculations beginning at column AH and extending to column AO, 5) An area for holding daily totals in rows 28 through 30, and 6) a fixed titles area across the top 12 rows of the matrix.


The model is viewed through a window 4 columns wide and 20 rows long. The titles for the columns and rows are fixed simultaneously using the BIC /TB at cell B12.

When the model is operated, the user first causes the instruction rows to fill the available 8 rows visible through the window. Then, by scrolling down, the 4 column wide instruction "chunks" are brought into view.

At the conclusion of instruction viewing, you are directed to go back to A13, which causes the window to be located once again over the data entry part of the model. Move to A13 now. (Remember, since A13 is in a protected title area you must use the >A13 technique). The model is designed so that after your activity names are entered, they always appear on the screen as you enter daily data or view results.

Hold the CTRL key and use the right arrow key to move right, one column at a time, while watching the screen. Stop at AG13. Notice that the days of the month continuously changed, but that the activity names remain fixed.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP33   
continue at the top of this page

with  
cursor  
at

take this action

?

move cursor to A13  
using >A13 method

A13

scroll cursor to  
AG13

# keypoint

## LAYOUT OF PERSONAL ACTIVITY ANALYSIS

		A	B	C	D	E	F	G	H	I-L	M - R	S-V	AG	AH	AO
INITIAL VISIBLE AREA	1.														
	12.		1	2	3	4	5	6	DAYS OF THE MONTH 7-10		11-16	17-20	31		
	13.														
	20.	NAMES <----->	DATA----->										TOTALS		
	27.														
	28.														
	30.														
	81.	ACTIVITIES				INSTRUCTIONS									
	89.														
	90.	NAME, MONTH, AND YEAR													
	97.														
	99.	DATA AND CALCULATIONS													
	109.														
	111.	PRINTING													
	125.														

TITLES

DATA AND  
CALCULATIONS

Use the down arrow key to move down one row at a time while watching the screen. Stop at AG30. Notice that the activities scroll upwards, but the top twelve rows of the matrix remain fixed.

A final thing to do is give the worksheet a name and also record the month and year it applies to.

Move the cursor to A1. Now move to B1 and enter the name for this example, MUSIC \$. Also enter the month, OCTOBER, and year, 1982, in the appropriate cells.

#### SUMMARY

Congratulations! You have successfully completed a guided tour of the Personal Activity Analysis. There are many uses for this tool in your work and personal life, for example: keeping track of your progress towards several goals; monitoring the progress of employees; or analyzing your own productivity.

This model illustrates how the use of the Title BIC can be used to keep you informed as you move around in a matrix area much larger than you can see through your window.

The other technique of note used in building this model is the method of protecting for division by zero using the @MAX function. This allowed the model to be useful regardless of how many of the 15 activities are used in any one month.

As an experienced user of this Application, you may want to make some of your own changes in its appearance/calculations to better suit you. For example, you may want to include a protection against negative totals, or you may want to change the recalculation prompt from manual to automatic.

Now let's look at the next Application.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP33 (R)  
continue from the top of page 170

with cursor at	take this action
AG13	scroll cursor down to AG30
AG30	type >A1 (R) move to B1
B1	type MUSIC \$ scroll to B2
B2	type OCTOBER scroll to B3
B3	type "1982 (R)

## YOUR VERY OWN DEAL ANALYZER

Most financial deals require you to make a cash investment at one or more times in a project in exchange for some cash returns in the future. What is this future cash really worth? Could you do better with a certificate of deposit at your neighborhood bank or savings and loan?

Your very own Deal Analyzer allows you to discount the future cash flows by your own discount rate to determine if the "deal" meets your criteria. A discount rate is just the average interest rate you would like to receive on the money you invest. As you recall from your introduction to the @NPV function, discounting a future cash flow is the process of determining the present value of a future cash receipt.

Refer to pages 174-175 to get an overview of the entire Application on the VisiCalc matrix. These are the results you find on your screen at the end of this example. The results section of the Deal Analyzer is printed on page 175. The actual position of the results section on the matrix is directly under the column where cash investments and cash returns are entered.

## HOW TO USE THIS APPLICATION

Let's load the Deal Analyzer into the VisiCalc matrix. Type /CY. Type /SLCP34 <sup>®</sup>. This will take a few moments to load. After the Application is loaded, your screen should look like page 177.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue at the top of this page

with  
cursor  
at

take this action

?  
A1

type /CY  
type /SLCP34 <sup>®</sup>

## keypoint

## YOUR VERY OWN DEAL ANALYZER

\*\*\*\*\*

MONTH	YEAR	\$AMOUNT
1	1982	1000<-ENTER--
		<-MAX OF
		<5 INVEST
		<--MENTS-
		<--HERE--

\*\*\*\*\*

DO NOT ENTER ANY MORE INVESTMENTS.  
BEGIN ENTERING CASH RETURNS  
IN ROWS 26 TO 60

\*\*\*\*\*

[illegible]

\*\*\*\*\*

ELAPSED MONTHS	CASH TRANSACTION'S PRESENT VALUE
1	100.00
2	95.24
3	90.59
4	86.03
5	81.57
6	77.20
7	72.92
8	68.73
9	64.62
10	60.59
11	56.64
12	52.76
13	48.96
14	45.23
15	41.57
16	37.98
17	34.46
18	31.00
19	27.61
20	24.28
21	21.01
22	17.80
23	14.65
24	11.56
25	8.53
26	5.56
27	2.65
28	0.00
29	0.00
30	0.00
31	0.00
32	0.00
33	0.00
34	0.00
35	0.00
36	0.00
37	0.00
38	0.00
39	0.00
40	0.00
41	0.00
42	0.00
43	0.00
44	0.00
45	0.00
46	0.00
47	0.00
48	0.00
49	0.00
50	0.00
51	0.00
52	0.00
53	0.00
54	0.00
55	0.00
56	0.00
57	0.00
58	0.00
59	0.00
60	0.00
61	0.00
62	0.00
63	0.00
64	0.00
65	0.00
66	0.00
67	0.00
68	0.00
69	0.00
70	0.00
71	0.00
72	0.00
73	0.00
74	0.00
75	0.00
76	0.00
77	0.00
78	0.00
79	0.00
80	0.00
81	0.00
82	0.00
83	0.00
84	0.00
85	0.00
86	0.00
87	0.00
88	0.00
89	0.00
90	0.00
91	0.00
92	0.00
93	0.00
94	0.00
95	0.00
96	0.00
97	0.00
98	0.00
99	0.00
100	0.00

0	1000	<---INVESTMENTS
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<-----

\*\*\*\*\*

END OF INVESTMENT TRANSACTIONS, BEGIN VIEWING

### RESULTS OF CASH RETURNS

\*\*\*\*\*

120	1025	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----
0	0	<--RETURNS----
0	0	<-----
0	0	<-----
0	0	<-----

# keypoint

3) ENTER DISCOUNT INTEREST RATE  
BELOW AND TYPE >B74 TO GO ON.

-----> 23<-----

4) TYPE ! TO CALCULATE THE RESULTS  
AND TYPE >B79 TO SEE THE RESULTS.

PRESENT VALUE OF

CASH INVESTED IS----->\$ 1000

PRESENT VALUE OF

CASH RETURNS IS----->\$ 1025

----->TYPE >B84 TO SEE MORE<-----

TOTAL ACTUAL CASH RETURN->\$ 10000

TOTAL ACTUAL CASH INVESTED\$ 1000

PAYBACK RATIO(ACT\$RET/\$INV) 10.00

P.V. ADJUSTED PAYBACK RATIO 1.02

-----> TYPE >B67 TO TRY AGAIN <-----

\*\*\*\*\*

Your Deal Analyzer is asking you to enter the month, year, and amount of the expected cash investments and cash returns associated with this deal. You must enter all of these as numbers. It can handle up to 40 separate transactions. You can enter transactions monthly, quarterly, or yearly. The Deal Analyzer doesn't mind. The only requirement is that the first transaction be entered on row 16. This is because the Deal Analyzer computes the elapsed time from this starting row. Read Instruction 1 and note that cash investments and cash returns are entered in separate areas on the VisiCalc matrix. We will begin by entering an investment.

Enter a cash investment of 1000 on January, 1982. Remember, the first investment must be entered in row 16 and all entries must be digits. The Deal Analyzer can hold numbers up to the tens of millions of dollars. If you deal in numbers bigger than that, congratulations! Seriously, just enter all your data in thousands of dollars if your deal involves cash transactions of over a million dollars.

Suppose this deal will return ten thousand dollars (10000) in January of 1992. Is this a good deal for you? We will move to the area on the matrix for entering returns and find out.

Move the cursor to A26. Enter the month, year, and amount of the cash return.

Look at your instruction number 2 on your screen. It says to move the cursor to A64 when you are finished entering the expected cash transactions associated with this deal. Move to A64 to receive additional instructions. These instructions direct you to B70 to enter a discount rate. Type >B70 (R).

with cursor at	take this action
A16	type 1 (R) move to B16
B16	type 1982 (R) move to C16
C16	type 1000 (R)
C16	move to A26
A26	type 1 (R) move to B26
B26	type 1992 (R) move to C26
C26	type 10000 (R)
C26	type >A64 (R)
A64	type >B70 (R)

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP34 (R)  
continue at the top of this page

# checkpoint 34

A16		R	
		11	
A	B	C	D
1	YOUR	VERY OWN	DEAL ANAL ZER
2			
3	1) PUT IN	THE EXPEC	TED CASH FLOWS
4	FROM T	HIS DEAL	(ENTER IN VESTMENTS
5	FROM R	OW 16 TO	ROW 20 AND ENTER
6	CASH R	ETURNS FR	OM ROW 26 TO 60.
7	ALSO E	ENTER THE	MONTH AND YEAR OF
8	EACH C	ASH TRANS	ACTION. NOTE: YEAR
9	MUST B	E 4 DIGIT	S (E.G. 1982).
10			
11	2) TYPE >	A64 WHEN	FINISHED. TYPE >A16
12	TO REE	ENTER OR R	EVISE CASH FLOWS.
13	*****	*****	*****
14	MONTH	YEAR	\$AMOUNT
15	-----	-----	-----
16			<-ENTER--
17			<-MAX OF--
18			<5 INVEST
19			<--MENTS--
20			<--HERE--



At B70, tell your Deal Analyzer what interest rate you wish to use to discount the future cash flows to their present value. This cell currently contains a 12 as a Default value. What discount rate should you use?

A good one to try is the amount of interest you could make on a relatively "riskless" investment, like a U.S. Government Treasury Bill. Let's try 9% (Note: this is an annual rate entered as a %). Type 9 and press (R). Look at your screen.

Instruction 3 is telling you to go to B74 to go on. Try it. Type >B74. Look at the screen.

Follow instruction 4 and press VisiCalc's recalculation key (!). Wait while the calculations are done. This may take half a minute! VisiCalc will let you know it's done when the ! disappears from the upper right-hand corner of your screen.

When this happens type >B79 to see your results. Look at the lower right part of your screen.

Not bad! The present value of the cash returned on the \$1000 you invested is 4079 dollars after being discounted at a 9% interest rate. If your screen has different results, please follow the instructions at the bottom of this page. As long as the present value of cash returned is greater than the present value of cash invested, you have exceeded the investment criteria (e.g., you would do better with this deal than the alternative of investing in a Treasury Bill). Of course, the deal may have a lot of risk associated with it and many other factors you have to consider. Let's see what else the Deal Analyzer has to say.

Follow the instructions on the bottom of the screen. Type >B84 and press (R). Look at that! We see that after adjusting the 10000 to its present value, the payback ratio is still a healthy 4.08 to 1.

with cursor at	take this action
B70	type 9 (R)
B70	type >B74 (R)
B74	type ! wait while cal- culations are performed
B74	type >B79 press (R)
B79	type >B84 press (R)

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
Type /SLCP34 (R)  
continue from the top of page 176

Your Deal Analyzer will allow you to try other discount rates. This can come in handy if you want to estimate the internal rate of return of the deal you're analyzing. The internal rate of return can be thought of as the discount rate which causes the present value of the returns to exactly equal the present value of the investment. Why is this so? Think about it.

Let's type >B67 and look at the lower part of the screen. Move the cursor to B70 and enter a new discount rate. You already know that the internal rate of return is greater than 9%. Why? That's right -- it's because the present value of the return was greater than the present value of the investment. Let's try 18%. Enter 18 and move to B74.

Type ! to calculate the results, then follow the instructions to see how you did.

Pretty close! Try a different rate of return of 23% at B70. What is the result? The present value of the investment is 1000 and the return is 1025 -- very close. Thus you have determined that this deal has an internal rate of return of approximately 23%.

Go back to A16 so you can practice some more deals. Then read the following section to see how the Deal Analyzer really works.

with cursor at	take this action
B84 B67	type >B67 <sup>®</sup> move to B70
B70	enter 18 move to B74
B74	type ! wait - it will take awhile
B79	move to B70 enter 23 and follow instructions on the screen
B79	move to A16 to try another deal

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP34 <sup>®</sup>  
continue from the top of page 176

## HOW DOES THIS WORK?

Keypoint page 181 illustrates how the VisiCalc matrix is used to create this model. A long rectangular area has been set aside for all of the interaction between you and the application. Move to A16. The top section has been fixed using the T(itles) command. It has been filled with labels to display the instructions to you. The Deal Analyzer was S(aved) with the cursor at A16, which is the first location for data entry.

The Visible Area limits you to looking at 5 lines as you enter raw data, set your discount rate, and view the computed results. At the right edge of the raw data area, labels which appear on the display point you back toward the data entry area. This is to discourage wandering out into the actual computational area.

The data entry area begins at row 16 and extends through row 60 and allows for forty separate cash transactions. Associated with each row of transaction data is a set of corresponding calculations. Let's see what they look like.

Move to L16. Look at the screen. In column I the Deal Analyzer must compute the number of months which have elapsed between the start of the deal and the cash flow in each data row. This will determine the number of compounding periods. Let's look at one of these formulas. Move to J16. Column J calculates the cash transaction's present value.

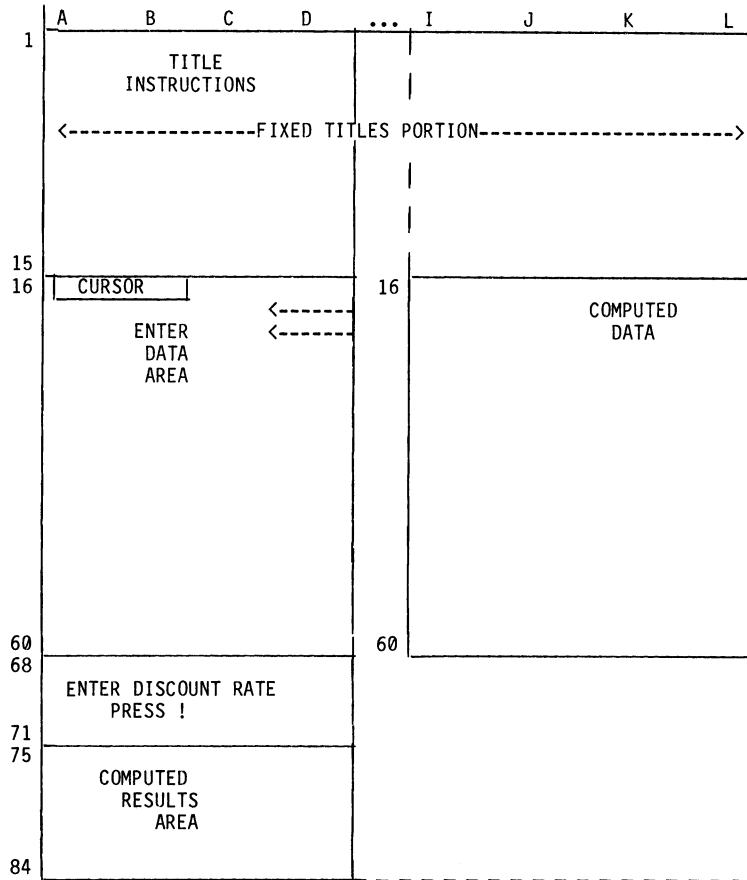
with cursor at	take this action
?	move to A16
A16	move to L16
L16	move to J16

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
 type /CY to clear the screen  
 type /SLCP34 <sup>®</sup>  
 continue at the top of this page

# keypoint

## LAYOUT OF DEAL ANALYZER



The formula is:

$$+C16/((1+(B70/1200))^A116)$$

This is not as complicated as it looks!

Let's look at this in words:

$$\text{PRESENT VALUE OF CASH RETURN} = \text{CASH RETURN} / ((1 + (\text{ANNUAL DISCOUNT RATE PERCENTAGE} / 1200))^{\text{ELAPSED MONTHS}})$$

Now look at the part in all those parentheses:

$$(\text{ANNUAL DISCOUNT RATE} / 1200)$$

This is the same as:

$$(\text{ANNUAL DISCOUNT RATE} / 12) / 100$$

Which is simply the monthly discount rate expressed as a fraction.

Therefore, our formula simplifies to:

$$\text{PRESENT VALUE OF CASH RETURN} = \text{CASH RETURN} / (1 + \text{MONTHLY DISCOUNT RATE})^{\text{ELAPSED MONTH(S)}}$$

with  
cursor  
at

take this action

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP34 <sup>®</sup>  
continue from the top of page 180

This is a form of the standard interest compounding formula you saw when you practiced the @NPV function. Can you think why the @NPV was not used in this model? That's right, it assumes the cash flows to discount are spaced at uniform time periods.

Let's move to the computations area for cash returns. Type >I26. Here we see the computation required to determine the number of elapsed months. The formula is:

`@COUNT(B26...B26)*((B26-B16)*12+(A26-A16))`

You can now see why the first transaction must be entered in row 16. A starting date must be established for all the other transactions to be relative to.

We also see the @COUNT function playing an important part in the formula. After all cash transactions have been entered, the remaining cells must be identified as blanks so the formula will evaluate to zero. The @COUNT function is used here to insure this will happen.

#### SUMMARY

All right! Remember to use the @COUNT function to identify blank cells. Also, you can make use of the narrow columnar design used from the model layout for those Applications which compute only a few results.

Hopefully you can use the analyzer to evaluate some of your own deals. As you know, the Deal Analyzer currently assumes a monthly compounding period. As an exercise, you might want to modify the analysis equations to use a user-specified compounding period. (Hint: You have to convert the number of elapsed months to years, quarters, days, as requested and adjust the interest rates accordingly). Good Luck!!

Let's look at the next Application.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP34 Ⓜ  
continue from the top of page 180

with  
cursor  
at

take this action

J16

move to I26

## PORTFOLIO VALUATION

This Application will keep track of your holdings in stocks, bonds, beer cans, baseball cards, or other esoterica and help you estimate the current value and paper profits you may have realized.

It also compares the assets' appreciation with a target value arrived at by applying an average annual % increase target factor to each of your assets' original purchase price.

Finally, it totals your gains and losses to give you a summary picture of the performance of your portfolio. Note that this model does not consider any dividends or other income you might realize from your holdings. Clear your screen and then type /SL. Now, specify the file name by entering CP35. It will take about 2 minutes. Refer to Keypoint pages 185-186 for printed copies of the matrix as it appears when this example is completed. Keypoint page 186 is an example of a report you may want to print sometime.

## HOW TO USE THIS APPLICATION

Your screen should look like page 187. First, enter a date at coordinates C4, C5, and C6. This information is used to compute the length of time you have held each asset. Use October 16, 1982 to try out this application. The year must be entered as 4 digits.

Move to D8. The Portfolio Evaluator is asking for a target appreciation rate expressed as an annual percentage (%). This % is used to compute the target value of each asset based on the number of years you have owned it. It is also used to compute an estimate of the current value per unit of each asset if you don't know the current value (called a default value). Enter 12 as your target appreciation rate.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue at the top of this page

with  
cursor  
at

take this action

?  
A1

type /CY  
type /SLCP35 ®

C4  
C5  
C6

enter 10  
enter 16  
enter 1982

C6

move to D8

D8

enter 12

# keypoint

## YOUR PORTFOLIO

1) ENTER THE DATE BELOW

CURRENT MONTH--> 10<-----  
 CURRENT DAY----> 16<-----  
 CURRENT YEAR---> 1982<4 DIGITS

2) ENTER TARGET INC. %/YR-> 12%<-----

3) ENTER DATA IN COLUMNS A-F FOR  
 UP TO 30 ITEMS - TYPE >A19 TO  
 CHANGE OR ADD ITEM NAMES

4) TYPE >B19 TO CHANGE/ADD ITEM DATA

5) TYPE ! TO VIEW REPORT IN COLS L-T

ITEM	PURCHASE		ORIGINAL UNITS	CURRENT \$/UNIT	CURRENT \$/UNIT	ELAPSED ORIGINAL	
	MONTH	YEAR				TIME IN \$/UNIT *	MONTHS MO. INT.
XYZ	9	1979	10	50	75<---!---	37	0
ACME	10	1980	20	100	120<---!---	24	0
3.					<---!---	0	0
4.					<---!---	0	0
5.					<---!---	0	0
6.					<---!---	0	0
7.					<---!---	0	0
8.					<---!---	0	0
9.					<---!---	0	0
10.					<---!---	0	0
11.					<---!---	0	0
12.					<---!---	0	0
13.					<---!---	0	0
14.					<---!---	0	0
15.					<---!---	0	0
16.					<---!---	0	0
17.					<---!---	0	0
18.					<---!---	0	0
19.					<---!---	0	0
20.					<---!---	0	0
21.					<---!---	0	0
22.					<---!---	0	0
23.					<---!---	0	0
24.					<---!---	0	0
25.					<---!---	0	0
26.					<---!---	0	0
27.					<---!---	0	0
28.					<---!---	0	0
29.					<---!---	0	0
30.					<---!---	0	0

NO MORE ITEMS CAN BE  
 ENTERED TYPE >B19



## keypoint

YOUR VERY OWN

## COMPUTED VALUATION REPORT

[illegible]

# checkpoint 35

C4		R	
		04	
A	B	C	D
1	Y O U R	P O R T F	O L I O
2	1) ENTER	THE DATE	BELOW
3			
4	CURRENT	MONTH -->	<-----
5	CURRENT	DAY ---->	<-----
6	CURRENT	YEAR --->	<4 DIGITS
7			
8	2) ENTER	TARGET IN	C. %/YR->
9			
10	3) ENTER	DATA IN C	OLUMNS A- F FOR
11	UP TO	30 ITEMS	- TYPE >A 19 TO
12	CHANGE	OR ADD IT	EM NAMES
13	4) TYPE	>B19 TO C	HANGE/ADD ITEM DATA
14	5) TYPE !	TO VIEW R	EPORT IN COLS K-S
15			
16		PURCHASE	PURCHASE
17	ITEM	MONTH	YEAR UNITS
18	-----	-----	-----
19	1.		
20	2.		

You have now completed the setup portion of the data required to operate the Portfolio Valuation Application. This is all you need to enter to generate a report if none of your assets' price per unit (share price if your assets are stocks) have changed since you last saved your portfolio. However, to try this out we need to enter data about some assets. Move to A19 (use the >A19 method) to look at the top of the screen.

Instruction 3 tells you that columns A through F contain all the data you need to enter about each asset. You can enter up to 30 different types of assets.

Suppose you own 10 shares of stock in XYZ Company that you bought in September of 1979 for \$50/share.

Enter this data now. First, type XYZ and press **(R)**. What happened? You're right. The label XYZ wrote over the prefilled-in item number. This is fine. Enter the rest of the data now in cells B19 through E19. Move the cursor to F19.

Now your Portfolio Valuation Application needs to know what the current price per share of XYZ is. Suppose as of October 16, 1982 the stock was selling at \$75 per share. Enter 75 at F19. Has this stock performed well enough to meet your target appreciation rate of 12%? Type ! to calculate the answer. Wait until the ! disappears from the upper right corner of your screen. This takes about 40 seconds.

You have now completed entering the data and have computed a report. Next you need to find it to view the results!

with cursor at	take this action
D8	move to A19
A19	enter XYZ, move to B19
B19	enter 9, scroll right
C19	enter 1979
	scroll right
D19	enter 10
	scroll right
E19	enter 50
	scroll to F19
F19	enter 75
F19	type !
	wait for the calculation to be completed

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP35 **(R)**  
continue from the middle of page 184

First, instruction 5 tells you to view the report in columns K - S. Move to M19 to view some results.

The result at K19 shows you how long you have held the asset. Your screen should say 37 months. The report also tells you at M19 that the asset has appreciated 50% (Remember its price rose from 50 to 75. Satisfy yourself that this is a 50% increase). Move to P19.

The result at N19 is simply the original value of your asset. It should say 500. Why? That's right, 10 shares at \$50/share is \$500 total value. Look at O19. It tells you that the current value of your XYZ stock is \$750. Do you know why? Now look at P19. The report is telling you that you have made a paper profit of \$250 on your XYZ stock. VisiCalc computes this by simply subtracting L19 from O19 as you can see on the Entry Contents Line. Now for something a bit more interesting. Move to S19.

The rest of the Portfolio Valuation report compares the performance to your target. The formula at S19 applies an annual compound growth rate equal to your target (12% in this case) to the original value of \$500. What is the result? Has XYZ exceeded the target? Look at R19 to see by how much.

You're correct. It has exceeded the goal by \$40.87. Look at S19 to see by what % the goal was exceeded. Your screen should say 5.76%.

with  
cursor  
at

take this action

F19

move to M19

M19

move to P19

P19

move to S19

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP35 ®  
continue from the middle of page 184


As an exercise, scroll back along row 19 to find instructions. Follow the instructions to enter a stock called ACME which was purchased in October of 1980. Assume that 20 shares were purchased at \$100 per share. Its current selling price is \$120. See what your Portfolio Evaluator says about its performance. [Hint: the description column is protected by a Title command so you have to use the >A20 to enter the ACME value]. After you've entered this data, press the recalculation key (!). Now, scroll across the results section until you come to S20. If you're correct, you should be able to make your screen look like page 191.

ACME is a bit sluggish. Although you've made a profit of \$400 in 24 months, ACME is still 4.34% below your target. When you're finished, look at row 50 of the report to see the overall performance of XYZ and ACME stock.

Now, let's see how this Application works!

with cursor at	take this action
S19	exercise move to A20
A20	exercise enter data
F20	type ! scroll to S20
S20	move to S50 view total results

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP35   
continue from the middle of page 184

# checkpoint 36

S20 /F\$ (V) @MAX(Q20,0)*((-Q20+Q20R
04

A	Q	R	S
---	---	---	---

1				!
2	1) ENTER			!
3				!
4	CURRENT	R T		!
5	CURRENT			!
6	CURRENT			!
7				!
8	2) ENTER			!
9				!
10	3) ENTER			!
11	UP TO			!
12	CHANGE			!
13	4) TYPE >			!
14	5) TYPE !		CURRENT	%
15			LESS	ABOVE
16		TARGET	TARGET	(BELOW)
17	ITEM	\$ TOTAL	\$ TOTAL	\$ TARGET
18	-----	-----	-----	-----
19	XYZ	709.13	40.87	5.76
20	ACME	2508.80	-108.80	-4.34

## HOW DOES THIS WORK?

Keypoint page 177 illustrates how the VisiCalc matrix is used to create this model. Move to A19 now.

The top section (rows 1-18) has been fixed using the Title command. The upper left side (columns A-D) is filled with labels which display instructions to you. Press the up arrow. What happened? The computer beeped to let you know it's a protected area.

The visible area limits you to looking at 2 lines (rows 19-20) as you enter or change your portfolio data. At the right edge of the data area (in column G), labels containing arrows appear on the display to point you back toward the data entry area. This is to discourage wandering as we noted earlier in the Deal Analyzer Application.

The data entry area begins at row 19 and extends to row 48, which allows for you to enter 30 separate assets. Associated with each set of data is a set of corresponding calculations. Move to B51 and note the message. Move back to B19. Let's see what the calculations are like.

Move to L19. Look at the formula in the Entry Contents Line. Curious! Since the CURRENT \$/UNIT is an entered data item, you would expect to find the formula +F19 here. Why? That's right, F19 is the location of the CURRENT \$/UNIT value. The reason for the strange looking formula is to allow the user to leave F19 blank if the current value of the asset is unknown. Let's see how this computes the default value (a value to use if the user leaves the current \$/UNIT value field blank).

First we must look at what the cell I19 contains. Move the cursor to I19.

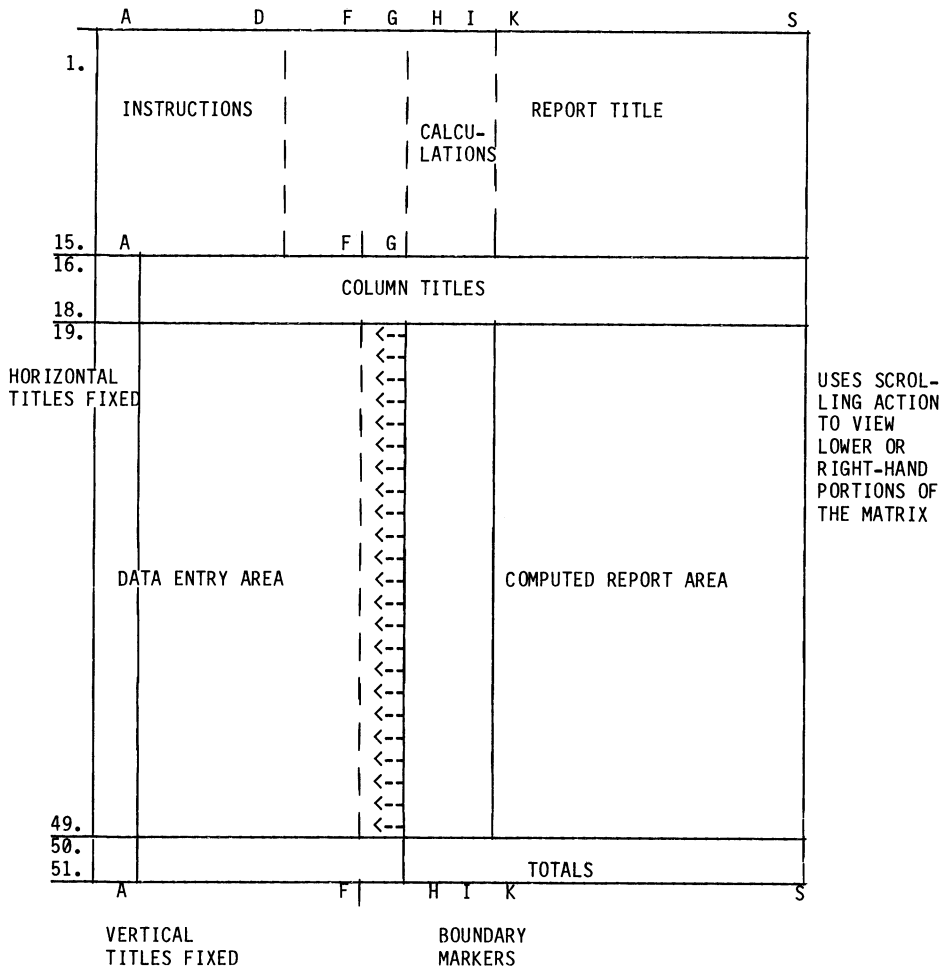
with cursor at	take this action
?	type >A19 ®
A19	press the up arrow
A19	move to G19
G19	move back to B19
B19 B51	move to B51 move to B19
B19	move to L19
L19	move to I19

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP36 ®  
continue at the top of this page

# keypoint

## LAYOUT OF PORTFOLIO VALUATION APPLICATION





The entire formula here is:

$(@COUNT(F19...F19)-1)*(E19*((1+(D8/100))^{(H19/12)}))$

When a value is entered at F19 (including a value of 0), the count at F19 will evaluate to 1 and cause the entire formula to evaluate to 0. Scroll the cursor to L19. This is where you view the CURRENT \$/UNIT in your report. If you enter a value for the current price per unit, the result in the report will be F19 (exactly what you entered because I19 will evaluate to zero as we just observed).

Let's continue a bit more to see why this is interesting. If the current price per unit is unknown when the data is entered, it will be left blank. In this case, the standard interest compounding formula is used to compute an estimated value in the report.

Use of the @COUNT function makes this possible. The count of a blank cell is zero. Substituting 0 for @COUNT(F19...F19) in the formula above, we see that the result will be the negative of the compound interest formula. Look again at your screen. The CURRENT \$/UNIT is calculated by the simple equation  $+F19-I19$ . In the case where F19 is left blank, I19 will contain a negative of the estimated current price and hence L19 will contain this positive result. Remember that a blank cell -- F19 in this case -- evaluates to zero so the formula becomes:  $0-(-I19)=+I19$ .

How could we really see the results in action? Of course! We must blank F19 and perform a recalculation. Move the cursor to F19, blank the cell and type !.

Wait for the recalculation to be performed and then move back to L19. You see the CURRENT \$/UNIT value is now 70.91 instead of 75.00. Why? Because the interest compounding formula is used to calculate the current price when the count at F19 equals 0.

with  
cursor  
at

take this action

I19

scroll to L19

L19  
F19  
F19

move to F19  
type /B (R)  
type !

F19

move back to L19

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP36 (R)  
continue from the top of page 192

Perhaps you are wondering why @COUNT was used instead of some other function or condition to signify "no value". Actually, @COUNT is the only way of identifying a blank cell. If, for example, a blank cell is referenced as a value, it is assigned the value of 0. This is by no means the same as no value at all. The @COUNT function allows you to discriminate between a blank and a 0 value, whereas any other solution would treat both a blank and a 0 value exactly the same. In such a case, you would not be able to specify a 0 value. Instead, the default value would be supplied even though it was not intended.

After understanding why @COUNT is the appropriate function, you may ask why a range of a single coordinate, such as F19 must be specified twice. That is, why use @COUNT(F19...F19) instead of @COUNT(F19)? The reason is that single arguments are treated as expressions rather than ranges and always count as 1. Thus, @COUNT(F19) evaluates an expression and always equals 1, regardless of whether the cell is blank or not. @COUNT(F19...F19) evaluates a range consisting of only 1 coordinate. If F19 is blank, the count will be 0.

We have now seen all of this Application's new equations and techniques. You might like to scroll across the worksheet and inspect the other formulas which have been used to calculate the other Valuation Report values. You should see some techniques used which are by now becoming familiar, such as the @MAX function protecting against zero division. Other than the @MAX and @COUNT functions used in conjunction, you should't see anything too mysterious. Look at these equations and see if you understand how they work.

with  
cursor  
at

take this action

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP36 ®  
continue from the top of page 192

## SUMMARY

If this Application looks pretty complicated, just remember that the arithmetic functions are very powerful and can help you develop some very flexible models.

The most important concept this Application presented was that of default values; those values which are supplied in case the user does not enter his/her own values. In our example, we used the @COUNT function to determine whether the user supplied his/her own value. If not, a default value was determined from previous information (using the @COUNT function). When you construct your own models, you may often want to include this concept in the design, thereby giving the user the option of entering some information without jeopardizing the rest of the calculations performed.

There is one final thing to consider. In order to make the most use of your Portfolio Valuation Application, you will probably want to save all previous totals and simply add new items or change specific values in the portfolio. To do this, you will have to format your own data disk and then save and retrieve the Portfolio Valuation when you update your assets' values.

For now, let's go on to the next Application.

with  
cursor  
at

take this action

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP36 (R)  
continue from the top of page 192

## YOUR NESTEGG PROJECTION

Saving for a rainy day is something everyone has done at one time or another. Most of us have put money aside for house payments, cars or saved for retirement. These kinds of computations are simple for short periods of time. When the length of time for saving the money stretches over months or years, interest compounding must be considered. When we save a regular amount every so often, the compounding formula increases its value. Withdrawing money after it has been accumulated is of special interest when planning a retirement account.

This type of computation is handled easily by your own Nestegg Projection. Refer to Keypoint page 198 to see a report of this example when it's completed.

To see this model in action, suppose that you wished to place \$100 in the bank, and that every month you would add another another 100 dollars to your savings. Now, suppose that you continued this process from now until you retired. After you retired, you would want to withdraw a certain amount of money each month to live on. To see how this scenario unfolds, follow through this example.

First, type /CY. Then type /SL and enter the file name CP37. Look at your screen. It should look page 200.

The cursor appears at cell D2. This is where we will enter the current amount of the Nestegg. It could be any amount. For this example, it will be 100. Enter 100.

The two rows below this contain the current month and year. Move the cursor to D3 and enter 12 for the current month. The line below this contains the year you will start saving. For our example, we'll keep this at 1982. Notice that you must enter the full year for the model to work.


### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue at the top of this page

with  
cursor  
at

take this action

?  
A1

type /CY  
type /SLCP37  
press 

D2

enter 100

D2

move to D3 and  
enter 12

# keypoint

## NESTEGG PROJECTION

1) Enter current nestegg->\$ 100  
2) Enter current month----> 12  
and year as 19xx-> 1982  
3) Enter interest rate %--> 12  
4) Enter number of compound-----  
ing periods per year----> 360  
5) Enter your current age-> 27  
6) At what age do you plan -----  
to retire-----> 65  
7) Enter amount you can -----  
save each month----->\$ 100  
8) How much do you want to -----  
receive each month when -----  
you retire?----->\$ 10000  
9) WHEN YOU RETIRE IN-----> 2020  
YOUR NESTEGG WILL BE-->\$ 954657  
AND WILL PROVIDE YOUR->\$ 10000  
PER MONTH FOR 25 YEAR(S)  
AND 10 MONTH(S).

## CALCULATION AREA

COMPOUNDING PERIODS THIS YR 0

### COMPOUNDING PERIODS TIL

RETIREMENT-----> 13600  
ACTUAL INTEREST RATE/PERIOD 3.333E-4  
BASE NESTEGG SUM-----> 9551.056  
SAVINGS PER COMPOUNDING PD. 3.333333  
ACCUMULATED SUM FROM MO. PY 945105.6  
TOTAL NEST EGG AMOUNT-----> 954656.7  
MONTHLY INTEREST .01  
MONTHS 310.8934

Cell D5 contains the interest rate you will receive on your savings. Enter 12.

Beneath this row is the number of compounding periods per year. In some Applications, it is possible to receive interest daily on savings deposits. In other cases, interest is computed on a monthly, quarterly or yearly basis. Move the cursor to D7. Type 360, since our interest is to be compounded daily and 360 is the established number of days for daily compounding per year.

The next line contains your current age. Move the cursor to D8. Type 27. The entry line below this contains your expected retirement age. This could be any year that the investment is expected to end. Let's assume it's 65. Move to D12 and enter how much money will be saved during each period. Type 100 and press **(R)**.

The next line contains the amount of money to withdraw after we are finished saving money in our Nestegg account. This could be any amount.

Several things can happen at this point. First, suppose that we wished to withdraw 1 million dollars a month. This would be nice while it lasted, but the number of years and months we would receive payments would be very small. However, if the withdrawal amount entered is too small, the model will show ERROR, indicating that the withdrawal of this amount could go on forever because interest generated by your nestegg's principal is larger than what you wish to withdraw.

Move your cursor to D15. Enter 6000. Now you have entered all the information required for this Application. To perform the calculations required for the results you must type !. The number of monthly withdrawals your Nestegg will provide will be shown on rows 19 and 20. Amazingly, you could withdraw 6000 per month forever (as the ERROR indicates). Try a larger number. Enter 10000 and type !. This time we see that the account will provide 10000/month for 25 years and 10 months. Not bad!

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 197

with cursor at	take this action
D3	move to D5 and enter 12
D5 D7	move to D7 enter 360
D7 D8	move to D8 enter 27 move to D12
D12	enter 100
D12 D15 D15	move to D15 enter 6000 type !
D15	enter 10000 type !

—

\_\_\_\_\_

Go ahead and experiment. Remember that ERROR results mean that the monthly withdrawal amount is too small to reduce the principal amount in your nestegg. Also notice that if your numbers get too big, VisiCalc will display >>>>>> in a cell location. The value will still appear on the Entry Contents Line.

#### HOW DOES THIS WORK?

Keypoint page 203 shows the layout of the Nestegg Projection. Notice that the data entry area consists of rows 1-15 and columns A-D. This means that the user can enter all the data necessary for the Nestegg's calculations without moving the cursor outside the initial window (the initial visible area). Though this is not the only Application with this feature, it provides a good opportunity to illustrate the concept of isolation of input data.

As we saw in the section entitled "Driving the Model with One Value," some of VisiCalc's real strength lies in the fact that the results section of a worksheet may depend on a relatively few number of input values. The user can drastically change the results of a model and perform "What If" analyses on the model by simply changing the few values which drive the model. The ease of benefiting from these possibilities is directly related to the isolation of input data and the model's layout.

When the Nestegg Projection is loaded, the user is immediately confronted with eight questions that provide all the input necessary to drive the model. This means that unless you are especially interested in looking at or changing the formulas used, the space on the matrix that they occupy does not interfere with the clarity of the data entry area and results section of the model.

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP37 (R)  
continue at the top of this page

with  
cursor  
at

take this action



Furthermore, the Application can be used repeatedly without changing any of the values in the formulas. This is because values that can vary in the formulas (i.e., variables) are always references to a cell in the data entry area or a cell that has already been calculated. In this way, the input data for the Application is isolated and the results depend entirely upon the values of the 9 constant parameters which the user enters.

The remainder of this section includes detailed explanations of the formulas developed and implemented to calculate the Nestegg Projection's results. If you wish to continue investigating how this Application works, please read on. Otherwise, you can skip the rest of this section.

Move the cursor to cell I7. This is the calculation used to determine the number of remaining compounding periods in a partial year. This calculation is available should you decide to begin saving in the middle of a year.

$$\frac{(360 - (\text{beginning month}) \times 30)}{(360/\# \text{ of compounding periods})}$$

Thus, if we began saving in November and interest was compounded daily, this expression would be 30 to indicate that 30 additional days of interest would be figured on the beginning amount for the remainder of the year.

Cell I11 contains the computation for the number of compounding periods until retirement. This is the difference between your present age and the age you will retire, multiplied by the number of compounding periods per year. Added to this quantity are any remaining compounding periods from the partial year computed above.

Cell I12 contains the actual interest rate per period:

$$ip = \frac{i/100}{n}$$

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP37 **®**  
continue at the top of page 201

with cursor at	take this action
D15	move to I7
I7	move to I11
I11	move to I12

keypoint LAYOUT OF NESTEGG PROJECTION APPLICATION

	A	B	C	D	E	F	G	H	I	K
1	REPORT TITLE					CALCULATION AREA TITLE				
2				cursor						
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

Where ip is the interest rate per period  
i is the annual interest rate expressed as a percent  
n is the number of compounding periods per year  
100 is used to convert the percentage to a fraction

The next row is where the base Nestegg sum is calculated. The formula is contained in I13. The formula is given by:

$$\text{Base sum} = P * (1 + ip)^m$$

Where P is the starting Nestegg amount  
m is the number of compounding periods until retirement

The savings per compounding period is located in I14. This computation reduces to:

$$\text{Savings per compounding period} = \frac{\text{Savings per month} * 12 \text{ months per year}}{\text{number of compounding periods per year}}$$

Which is the dollar amount put in the account for each interest compounding period.

The next row calculates the accumulated sum from the monthly periods. I15 contains the formula.

$$[\text{Savings per compounding period} * (1 + \text{interest rate per period})^m - 1] / \text{interest rate per period}$$


Cell I16 contains the sum of two numbers, +I13+I15. This is the sum of the compounded initial savings and the accumulated sum from the monthly periods.

Before we finish out these computations, let's scroll back and see where each of these formulas are used in computing your Nestegg.

The simplest of the calculations occurs in cell D16, where the year in which you will retire is calculated. This calculation is the present year plus the difference between your present age and

with cursor at	take this action
I12	move to I13
I13	move to I14
I14	move to I15
I15	move to I16
I16	move to D16

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP37   
continue from the top of page 201

your retirement age.

The amount of the Nestegg at the end of the compounding period is the result of the calculation performed in cell I16 (sum of accumulated monthly savings and the compounded initial savings) and appears in cell D17.

Two calculations remain. These are used when determining how many months your Nestegg will last. These values appear in cells C20 and B21, respectively.

Let's return to cells H17 and G18. Cell H17 evaluates a rate. @LOOKUP multiplies the money in your account by the monthly interest rate. It subtracts from this value the amount of money you wish to withdraw each month. If the result of this subtraction is a positive number, you will be able to go on withdrawing funds forever. VisiCalc will display an ERROR value in the table for the number of months and years you will receive that amount. If the number is any negative value, the interest rate is taken as the same one used to compute the Nestegg  $(+D5/12/100)$ .

You can scroll to the Lookup table beginning at K13 to verify these calculations.

Move to G18 to find the final computation. If H17 equals zero, then VisiCalc writes ERROR. If a negative number were to occur, VisiCalc would also evaluate the logarithm as an Error.

If H17 does not equal zero, computations are performed to determine the number of months a fixed withdrawal can be made from the Nestegg. The formula involves logarithms, and the @LOG10 function of VisiCalc is used to help.

Returning to the computations made at C19 and B20, we are now able to understand where these numbers are coming from. The number of whole years of withdrawals which can be made from the Nestegg are determined by dividing the number of withdrawals by the number of months in a year  $(+G18/12)$ . The remainder of this division is used to compute

with  
cursor  
at

take this action

D16

move to D17

D17

move to H17

H17

move to G18

G18

move to C19


C19

look at the formula  
and move to B20

B20

look at the formula

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP37   
continue from the top of page 201

months remaining to complete withdrawing all of your Nestegg.

#### SUMMARY

The important concept of isolating the input data which controls the model, was introduced in this Application. Hopefully, you will remember to include this concept when you design your own VisiCalc models. In this way, the model depends only on the values of the constant parameters entered by the user. Changes in data entries will not affect the way formulas are used in the model. That is, the formulas will not have to be altered to accomodate input changes since they contain references to locations in the matrix rather than actual constants.

If you read all of the previous section, you have also been introduced to the @LOG10 function. This function has a special restriction. Since the logarithm will not evaluate a negative expression, special care needs to be taken to ensure that a negative number never appears as an argument for the logarithm. The @LOOKUP function provides this built-in protection for the formula.

Now, let's look at the final Application.

with  
cursor  
at

take this action

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP37 <sup>®</sup>  
continue from the top of page 201

## LOAN REPAYMENT SCHEDULE

Loan repayment schedules are typically computed by lending institutions to determine monthly payments the borrower will have to pay. They also calculate what payments are necessary to pay off a loan in a certain time period. Although this VisiCalc Application may not perform this function exactly, it will give you a good idea of the options you have in repaying borrowed money. Look at Keypoint page 208 to see the complete Loan Repayment Schedule. Let's try it now.

Type /CY. Type /SL, then type CP38 <sup>®</sup>. Look at your screen. It should look like page 209.

The Loan Repayment Schedule Application asks you to enter:

- The principal borrowed
- Interest rate of the loan
- Number of years the money is borrowed
- The number of payments per year
- A particular year's repayment schedule you desire

To compute your result, each monthly payment is broken down into two amounts. First, the interest part of the payment is determined. Second, the amount of the payment going towards the principal is computed. At first, the largest part of a payment goes towards the interest. As time progresses, more and more of the monthly payment goes toward the principal.

Let's see how to use the repayment schedule. Be sure the cursor is at E3. Suppose that you are interested in borrowing money to buy a house and you need an \$80000 loan. Enter 80000.

Right below the principal borrowed is the interest rate for the loan. The nominal interest rate is the un compounded annual interest rate of the loan. Suppose that this is 12%. Move the cursor to E4. Enter 12.

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue at the top of this page

with  
cursor  
at

take this action

?  
A1

type /CY  
type /SLCP38 <sup>®</sup>

E3

type 80000  
press <sup>®</sup>

E3  
E4

move to E4  
type 12 <sup>®</sup>

keypoint

LOAN REPAYMENT SCHEDULE

PRINCIPAL BORROWED IS.....\$ 80000  
NOMINAL INTEREST RATE 12  
LENGTH OF LOAN IN YEARS 15  
PAYMENTS PER YEAR 12  
THIS IS A SCHEDULE FOR YEAR 1

PAYMENT AMOUNT IS.....\$ 960  
TOTAL NUMBER OF PAYMENTS 180  
TOTAL AMOUNT OF PAYMENTS..\$ 172824

TOTAL AMOUNT OF PAYMENTS					INTEREST/ PERIODS		
						-180	1
PAYMENT	BEGIN	INTEREST			ENDING	ROW	
NUMBER	PRINCIPAL	PAYMENT	PART	PART	BALANCE	NUMBER	
						1	
1	80000	960	800	160	79840	1	2
2	79840	960	798	162	79678	2	3
3	79678	960	797	163	79515	3	4
4	79515	960	795	165	79350	4	5
5	79350	960	793	167	79183	5	6
6	79183	960	792	168	79015	6	7
7	79015	960	790	170	78845	7	8
8	78845	960	788	172	78673	8	9
9	78673	960	787	173	78500	9	10
10	78500	960	785	175	78325	10	11
11	78325	960	783	177	78148	11	12
12	78148	960	781	179	77969	12	

## checkpoint 38

E3 (V) 0		R	
		16	
B	C	D	E
1	LOAN REPAYMENT SCHEDULE		
2			
3	PRINCIPAL BORROWED	IS.....\$	0
4	NOMINAL INTEREST RATE		10
5	LENGTH OF LOAN IN YEARS		1
6	PAYMENTS PER YEAR		1
7	THIS IS A SCHEDULE FOR YEAR		1
8	-----	-----	-----
9	PAYMENT AMOUNT IS.	.....\$	0
10	TOTAL NUMBER OF PAYMENTS		1
11	TOTAL AMOUNT OF PAYMENTS..\$		0
12			
13			
14			
15	BEGIN	INTEREST	PRINCIPAL
16	PRINCIPAL	PAYMENT	PART
17	-----	-----	-----
18	0	0	0
19	0	0	0
20	0	0	0



The cell below the interest rate contains the length of the loan in years. Suppose the period of the loan is 30 years. Move the cursor to E5. Enter 30.

The next entry is the number of payments per year. Typically mortgage payments are made on a monthly basis. Thus, we should enter 12. Move the cursor to E6 and enter 12.

The next entry calls for the year of the repayment schedule you are interested in. For example, if you are interested in the first year's payments, enter a 1. If you enter the year 31, all the remaining calculations will be zeros because the loan will be paid off by this time. For now, leave the value in E7 as 1.

Rows 9 through 11 are computed by VisiCalc. The monthly payment is a combination of a principal payment and a payment on the interest. The total number of payments is just the number of years the loan covers multiplied by the number of payments per year. To find out what these numbers are, press the recalculate key (!). This tells VisiCalc to recalculate the monthly payment and number of payments you will need.

At the bottom of your worksheet are eight columns (only 4 of these are now visible). Column A contains the number of the loan payment. Column B contains the beginning principal, and column C contains the monthly payment. This number is the same regardless of the year of the loan. The next two columns give the interest and principal part of the payment. The ending balance column is the difference between the beginning principal and the amount of principal paid in a month.

with cursor at	take this action
E4 E5	move to E5 type 30 (R)
E5 E6	move to E6 type 12 (R)
E7	type !

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 207

Now you are ready to see the Loan Repayment Schedule in action. Look at cell C18. Notice that for the first month of the loan you paid \$823, \$800 of which is interest, and \$23 towards the principal.

Now that you understand what the model does, it's time to explore some of the possibilities available to you when taking out a loan. Move to E1.

First, decrease the number of years to repay the loan from 30 to 15 (in cell E5) and recalculate. Notice anything? The amount of the monthly payment went up to \$960. What is surprising is that it did not go up that much. Notice that the amount paid towards the principal went up as well.

Now, increase the interest rate and observe how the fluctuation in the interest rate affects the payment schedule. You may even wish to investigate the consequences of taking out a loan at different interest rates to see how the monthly payments differ.

#### HOW DOES THIS WORK?

The Loan Repayment Schedule Application is another good example of isolating the input data. When the Application is loaded, the user only has to enter 5 constants and press the recalculate key before results will be returned.

Suppose you wanted a printed copy of each year's payment schedule for the 15 year loan above. The ease with which this could be done illustrates another useful concept in VisiCalc programming.

The VisiCalc matrix is large, but it's not limitless. Neither is your computer's memory, which is where the matrix resides while you're running VisiCalc. Suppose the model for the Loan Repayment Schedule was constructed such that each year's payment schedule was calculated and printed simultaneously on the worksheet. Undoubtedly,

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
continue from the top of page 207

with cursor at	take this action
E7	move to E1
E1 E5	move to E5 enter 15 and type !
?	experiment

there would be a limit to the number of years a payment could extend over and still fit the entire report on the matrix, or in the computer's available memory. This design would also require the user to move continuously around the matrix in order to view each year's results.

An alternative to this "over-use" of the matrix is the actual design of the Loan Repayment Schedule. The formulas and the model's layout are constructed so that a single change in the schedule's current year (a constant parameter entered by the user) will cause the new results to overlay the previous results.

In this way, the matrix and the amount of memory used are kept small but the model becomes very dynamic. The task of printing a report of each year's schedule now becomes easier. Simply specify the year for each schedule, recalculate for results and then print the report. The coordinates for printing the report section will always be the same, yet each time they will contain different data.


Once again, the remainder of this section will introduce you to some of the formulas used to calculate the Loan Repayment Schedule. If you are interested, please continue. Otherwise, turn to page 216 and read the final two sections of the book.

There are five main calculations performed by VisiCalc to determine the yearly Loan Repayment Schedule, which is designed as shown on page 213. Scroll towards rows 18-29 to see the whole 1st schedule. Now, let's see how its computed.

Move to E9 to see the formula, which is a bit complicated. VisiCalc computes the monthly payments necessary to pay off the loan in the number of years given. Mathematically, this equation is:

$$A = (P) * \frac{i(1+i)^n}{(1+i)^n - 1}$$

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP38   
continue from the middle of page 211

with  
cursor  
at

take this action

?

scroll around the  
report area

?

move to E9

# keypoint

LAYOUT FOR LOAN REPAYMENT SCHEDULE

	A	B	C	D	E	F	G	H-N
1		APPLICATION TITLE						
2								
3								
4		DATA ENTRY AREA						
5								
6								
7								
8		<----->						
9								
10								
11								
12								
13								
14								
15	PAYMENT	BEGIN		INTEREST	PRINCIPAL	ENDING	ROW	
16	NUMBER	PRINCIPAL	PAYMENT	PART	PART	BALANCE	NUMBER	
17								
18								
19								
20								
21		<----- RESULTS SECTION ----->						
22								
23								
24								
25								
26								
27								
28								
29								
	A	B	C	D	E	F	G	H

CURSOR COMES UP AT E3.  
COLUMN A IS OFF THE  
SCREEN TO THE LEFT.

where:  $i$  is the monthly interest rate

$n$  is the number of payments

$P$  is the amount borrowed

$A$  is the monthly payment

For a more complete discussion of these types of formulae, consult a text on interest rate formulas.

The next calculation at E10 is the easiest one. After the period of the loan and yearly payments are put in, VisiCalc multiplies them to determine total number of payments. This is just  $+E5 \times E6$ .

The next calculation (E11) discovers the total amount of payments by multiplying the number of payments (E10) by each payment's amount (E9).

The VisiCalc computation which determines beginning principal is shown in cell B18. It is just:


$$\text{Beginning Principal} = (P(1+i))^n - \frac{A*(1+i)^n - 1}{i}$$

Where:  $P$  is the principal borrowed  
 $i$  is the monthly interest rate  
 $n$  is the number of payments  
 $A$  is the monthly payment

This computation contains two parts. The first part is the borrowed money compounded over the length of the loan. The second part is the amount of the loan that has been paid up to the present year. Their difference represents the amount of beginning principal.

with cursor at	take this action
E9	move to E10
E10	look at formula move to E11
E11	look at formula
E11	move to B18

### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP38   
continue from the middle of page 211

VisiCalc calculates the principal and interest portions of the monthly payment. The interest portion of the monthly payment is the monthly interest rate times the remaining principal. The principal part of the loan is the difference between the monthly payment and the interest part.

The ending balance is the difference between the monthly beginning principal and the amount of the principal paid. Cells F18-F29 contain this calculation.

There is one final note about the computations VisiCalc must perform to display this model. Whenever the number of payments exceeds the number of payments expected over the life of the loan, VisiCalc writes a zero in every column. This indicates that no computation is needed (your loan is paid off). Cells B18-B29 contain this calculation.

with  
cursor  
at

take this action

#### If you are hopelessly lost:

press the BREAK key to clear the Prompt Line  
type /CY to clear the screen  
type /SLCP38 <sup>®</sup>  
continue from the top of page 211

## SUMMARY

The Loan Repayment Schedule introduced you to a final useful concept in VisiCalc programming. This dynamic model allows the user to conveniently inspect a table that generates a loan's repayment schedule during any specified year. The model's design allow the specified year's schedule to overlay the previous schedule. In this way, the Application becomes easy to use, inspect results, and print reports from.

## APPLYING WHAT YOU HAVE LEARNED

You have now seen VisiCalc in action, from simple models to more advanced Applications. You are probably bursting with ideas on how to use VisiCalc. Hopefully, this book has helped you learn to build your own models.

As you have seen, most models have four basic parts: 1) labels (and instructions if needed); 2) input data entry area; 3) calculations area (provided there are multiple calculations to perform before obtaining the results); and 4) area for displaying the computed results.

The following outline is a summary of the concepts that have been introduced and applied in this tutorial. We suggest that you follow these steps in order to build accurate, dynamic and useful VisiCalc models.

- 1) Decide what areas of the matrix you will use for each part of the model. Sketching the model on paper may help.
- 2) Isolate the area for entering input data. Remember that these data items are the parameters which drive the model, making it

If you are hopelessly lost:

with  
cursor  
at

take this action

both flexible and dynamic. This was shown in the Profit Analysis Model where January income and the growth rate were the two values driving the entire model. This concept was also effectively used in the Applications presented.

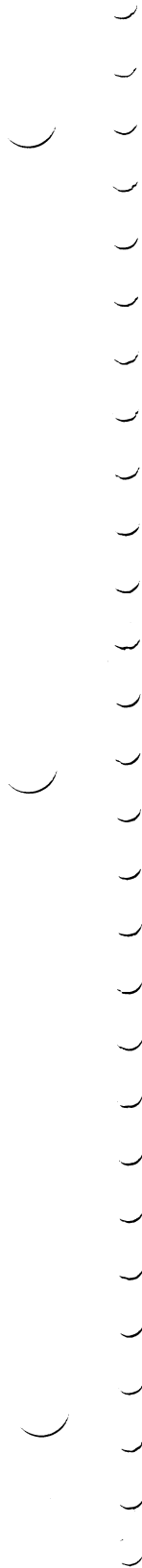
- 3) Enter labels and instructions to annotate the model.
- 4) Develop and enter the formulas. Simple calculations may be entered as formulas in the results section of the model, while more complex calculations may need to be entered in the calculations area of the model. Make use of the Built-In Functions to help perform the calculations. Also, remember to use cell references (i.e., variables) in the formulas whenever possible to keep the model both dynamic and efficient. Finally, build in protections against errors (e.g., division by zero) that may otherwise propagate errors throughout the entire model.
- 5) Include fixed titles and/or multiple windows if they increase the clarity of the model.
- 6) Enter any remaining data and review the model to see if it can be modified to become more efficient and flexible.
- 7) If you want to save the model for future use, store it on an initialized diskette.

Have fun using VisiCalc!

<b>If you are hopelessly lost:</b>
Ask for your money back.

with cursor at	take this action





## GLOSSARY

APPLICATION - a carefully constructed VisiCalc matrix that can display results for any number of cases dealing with a specific problem or question

AUTOMAGICALLY - the method by which any of a number of complex processes in a computer system occur, characterized by the user not needing to know or care how the process works

BIC - abbreviation of Built-In Command; used to refer to any of the VisiCalc commands available when the slash (/) key is pressed (see the VisiCalc Command Reference Chart)

CELL - any one location (coordinate) on the VisiCalc spreadsheet; example -- "There is currently a label in cell D27, but there are some empty cells just below it."

CHARACTER - any symbol that can be typed and takes up one space in a cell; examples -- the letter G, the symbol +, a blank space

COMMAND - a specific typed instruction to which VisiCalc responds with an action(s) affecting some or all of the VisiCalc matrix; commands affect such things as: format, column width, recalculations, row/column inserts and deletes (see also BIC)

CONSTANT - a value (number) that is fixed; in VisiCalc, either a single number as the expression in a cell, or a single number contained in an expression; example -- in the expression +B16-21.5, 21.5 is a constant and B16 is a variable

COORDINATES - the notation system used to describe the physical location of cells in the VisiCalc matrix; example -- the coordinates of the cell at row 3 in column E are E3

CURSOR - from the Latin word for "runner", the cursor is the white box that fills the VisiCalc cell currently available to be worked on; the user can move the cursor to any location in the matrix

DEFAULT - the condition chosen or given in the absence of a specific request; example -- the default VisiCalc column width is 9 characters, i.e., VisiCalc will assume that you want the column width to be 9, unless and until you explicitly tell it differently

DIRECT CURSOR MOVEMENT - moving the cursor by typing ">"; after "Go to: Coordinate" appears on the Prompt Line, type in the cursor's destination and press RETURN

DISK DRIVE - the mechanical device which reads and sends information from diskettes to the computer, as well as receives and writes information from the computer onto diskettes

DISKETTE - a small, magnetically coated plastic circle in a protecting cardboard jacket; used as a medium for permanently storing information in the computer's memory

EDIT LINE - the black line immediately below the white block at the top of the VisiCalc screen (see page 5); any entry you type is displayed on the Edit Line, where you can "edit" the information until you press the RETURN key

ENTRY CONTENTS LINE - the white line at the top of the VisiCalc screen (see page 5); shows the location of the cursor, and the contents of the cell at that location, including explicit format (if any), an indicator showing whether the cell contains a Value or a Label, and the actual contents of the cell; the right side of this line contains either a C (column) or an R (row) indicating the order of recalculations in the matrix

ERROR - an attempt to enter something that the computer cannot accept; expressing something impossible in mathematical terms; the most common example is division by zero

EXPRESSION - any formula or number contained in a cell and classified by VisiCalc as a value; examples -- +F37+G6/12 is an expression, 762.04 is an expression, 50 PERCENT is not an expression

FINANCIAL MODEL - a model which calculates or projects personal or corporate financial situations

FORMAT - a rule used to determine exactly where and how to display a value or label within a cell; examples -- Format \$ causes values to be displayed to two decimal places, Format Left-Justify causes labels to be displayed flush with the left side of the cell

FORMULA - a sequence of values (numbers and/or variables) and mathematical operators (e.g., +, -, \*, /) and/or other notations (e.g., (, ), @SUM, ...) that produce a final resulting value or values

FUNCTION - a mathematical procedure available to the user via a simple command; example -- @SUM is a function that sums (totals) a series of numbers specified by the user

GLOBAL - affecting the entire model; one of the BIC's (see the VisiCalc Command Reference Chart)

INDIRECT CURSOR MOVEMENT - moving the cursor by holding the CTRL key and pressing one of the four arrow keys on the right-hand side of the keyboard

INTEGER - a whole number; examples 12, 9, -400

JUXTAPOSE - to place adjacent to

LABEL - any VisiCalc entry which is not intended to be treated as a value; designated "(L)" on the Entry Contents Line

LEFT-JUSTIFY - to line up the left edge of a VisiCalc entry flush with the left edge of the cell containing it (only affects the display, not the actual entry contents); this is the default format for labels

LOAD - to put a computer program or data file into computer memory; VisiCalc is a computer program which must be loaded into the computer's memory before it will work; VisiCalc models are data files which can be retrieved from storage and loaded into the VisiCalc matrix

MATRIX - a table of rows and columns that make up the VisiCalc spreadsheet

MEMORY - a location in the computer where programs such as DOS and VisiCalc are loaded from a diskette and stored until they are replaced by new information or the computer is turned off; data is also stored in memory so you can save your models and examples on diskettes for future use

MODEL - a mathematical representation of a process or procedure

MONITOR - a CRT (Cathode Ray Tube) display screen used by VisiCalc to communicate visually with the user; a "TV" screen

OPERATOR - a sign indicating an arithmetic operation:  
+ indicates addition  
- indicates subtraction  
\* indicates multiplication  
/ indicates division  
^ indicates exponentiation

OVERFLOW - a condition wherein a number to be displayed in a cell is larger (more digits) than the current width of the cell; VisiCalc displays ">" symbols in the cell, rather than a misleading partial number (only the display is affected)

PRINT - creating a paper copy of the information currently in the computer's memory

PROFIT ANALYSIS MODEL - an example of a financial model constructed in Part II of this tutorial

PROMPT LINE - the second line in the white box at the top of the VisiCalc screen (see page 5); used to prompt the user and to provide feedback on the user's current location; this includes text indicating the entry of a label or a value

RELATIVE - used in replicating formulas; each variable to be replicated must be declared relative or non-relative -- non-relative variables do not change from cell to cell, but relative variables change from cell to cell relative to their location

RELOAD - the process of loading a program or file a second time -- see LOAD

RIGHT-JUSTIFY - to line up the right edge of a VisiCalc entry flush with the right edge of the cell containing it (affects only the display, not the actual entry contents); this is the default justification format for values

SCROLL - to cause the view of the VisiCalc matrix to "roll" up or down or left or right across the screen; the visual impression is reminiscent of the motion of a scroll

SHAZAM - a cross between alakazam and sheesh

SOURCE CELL(S) - the cell or set of cells to be replicated from; the starting point(s)

SOURCE RANGE - used with the Replicate command; specifies the cell(s) to be replicated

STORE - saving a computer program or data file on a diskette for future use

TARGET CELL(S) - the cell or set of cells to be replicated into; the contents of the Source cell(s) are "copied" into the Target cell(s)

TARGET RANGE - used with the Replicate command; specifies the cell(s) the "Source range" is to be replicated into

TYCOON - one who produces insightful financial models, using VisiCalc

VALUE - any VisiCalc entry intended to be treated as a formula or a constant; designated "(V)" on the Entry Contents Line

VARIABLE - a location name representing a number to be found by evaluating the expression at the coordinate that is the name of the variable; example -- a variable named M47 is treated by VisiCalc as if it were the number that is found at location M47, whatever that number may be

WINDOW - the portion of the VisiCalc matrix that is visible on the screen; it is possible to display two windows on the screen simultaneously, using the /W BIC (see Using Windows, page 126)

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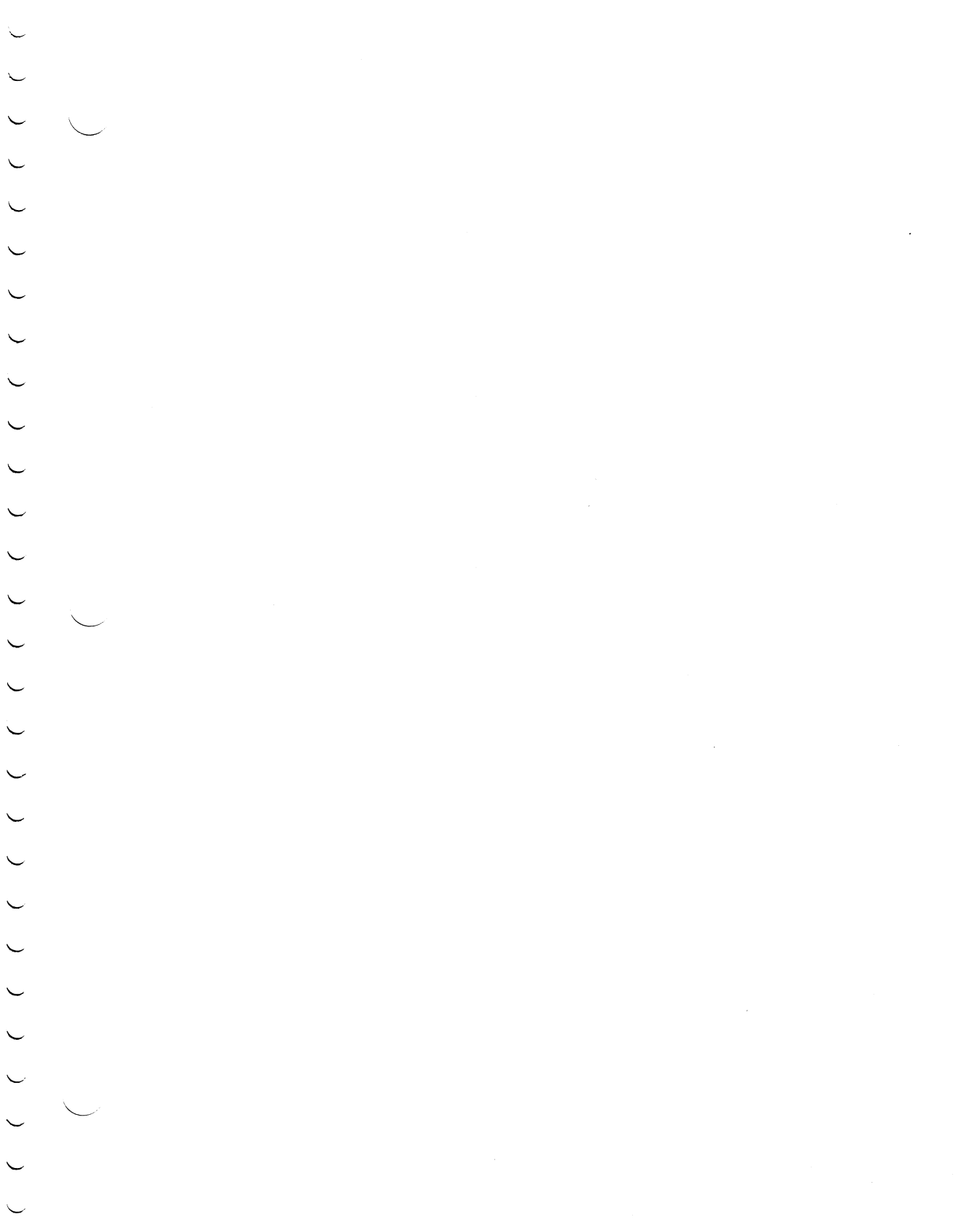
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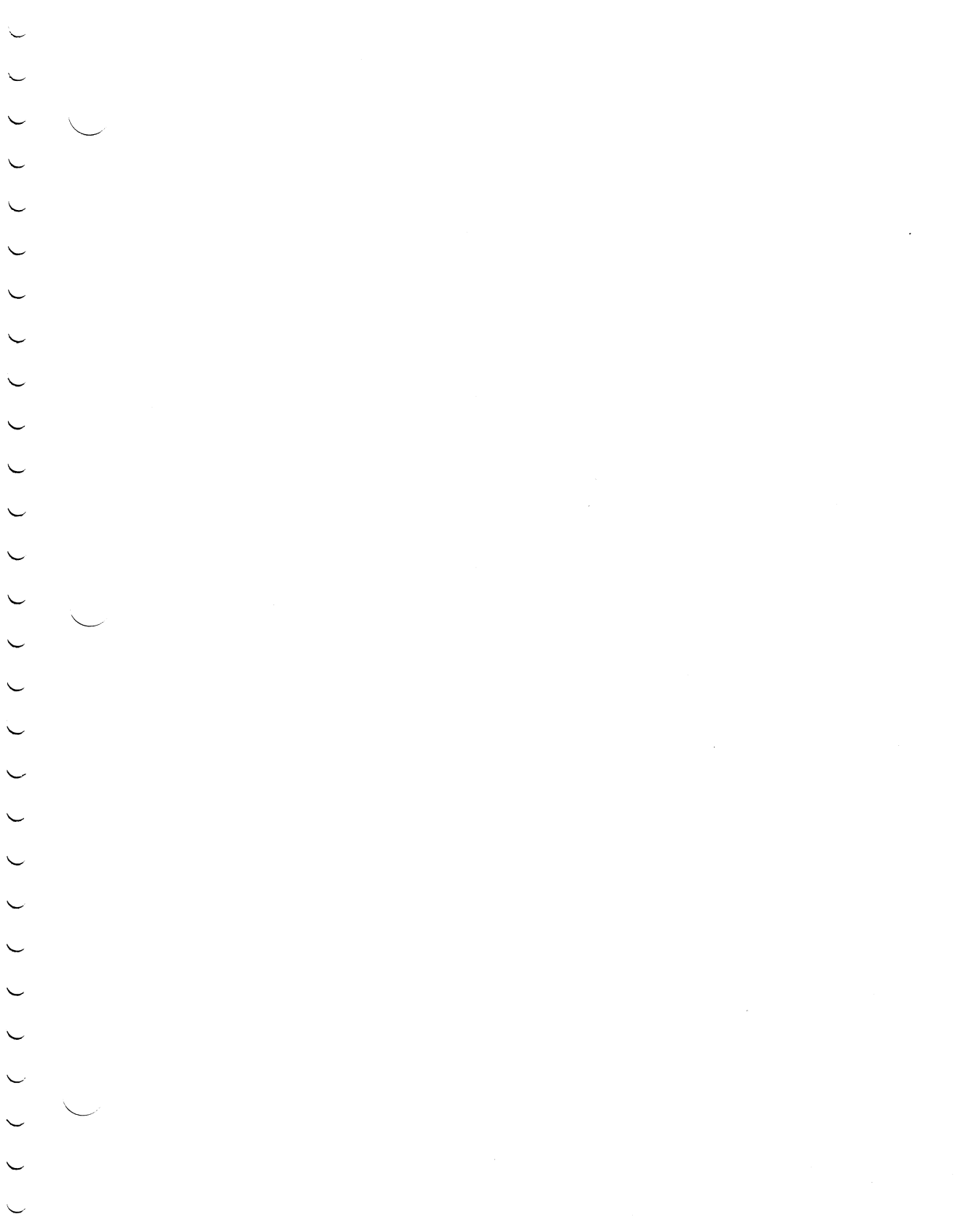
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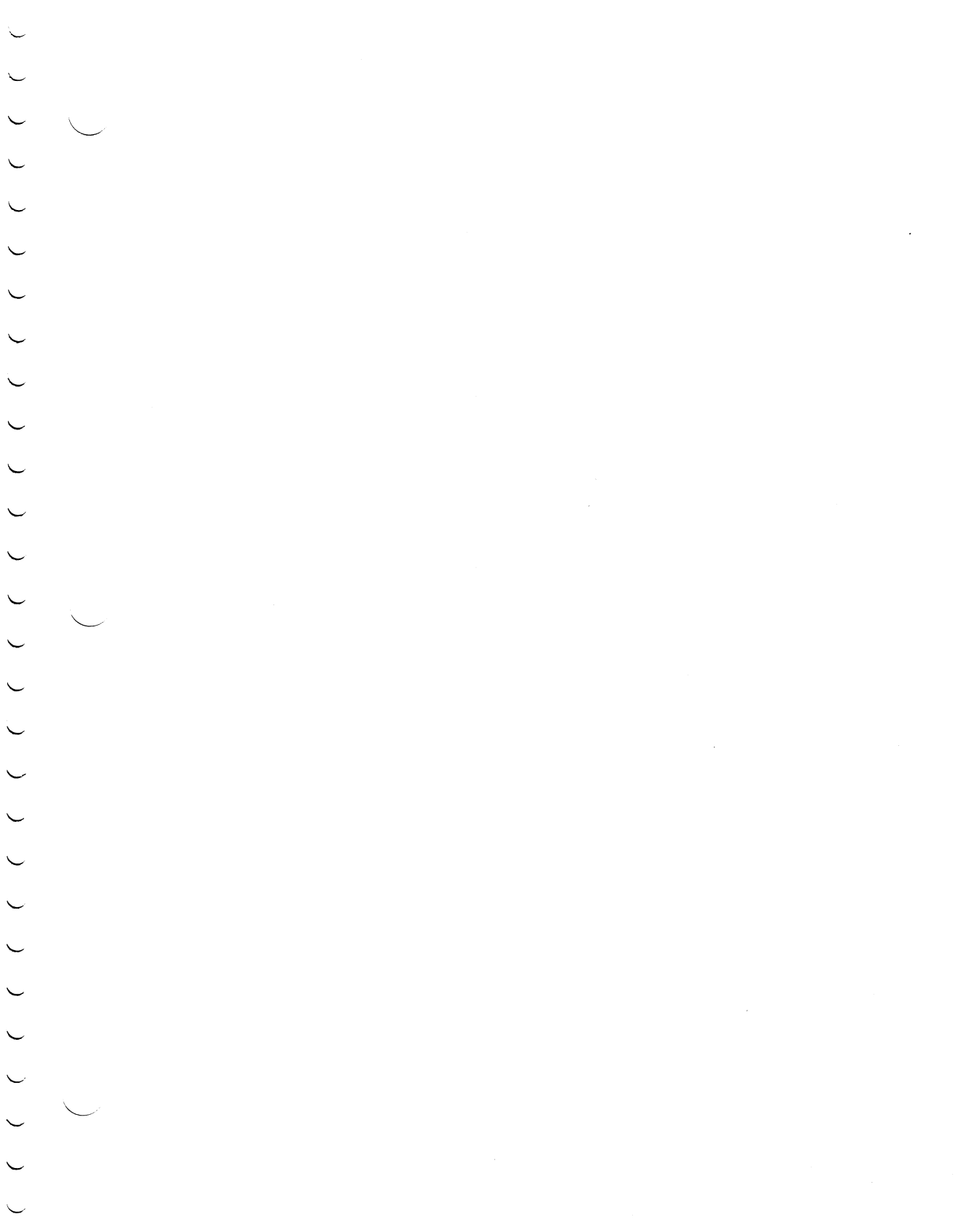


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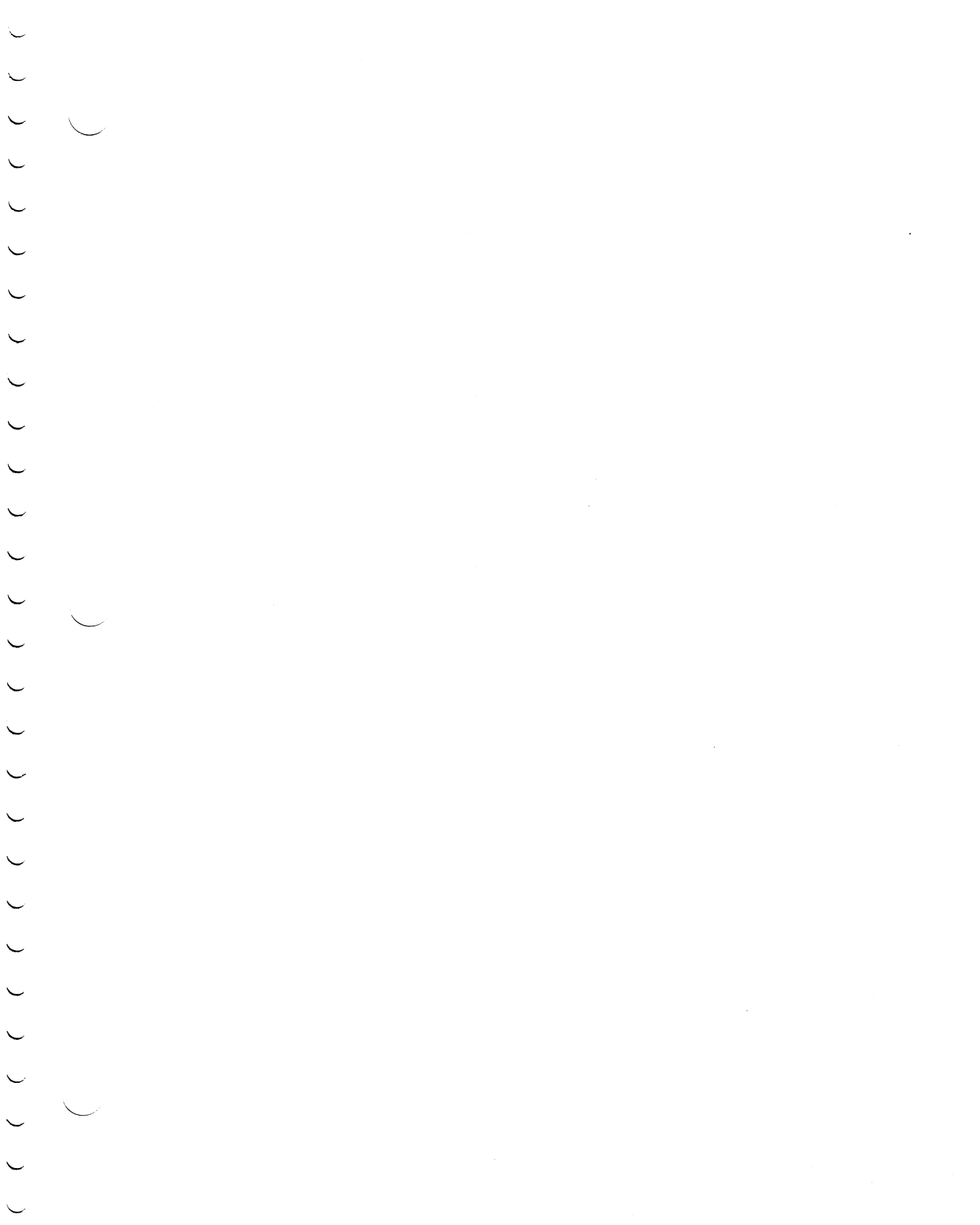


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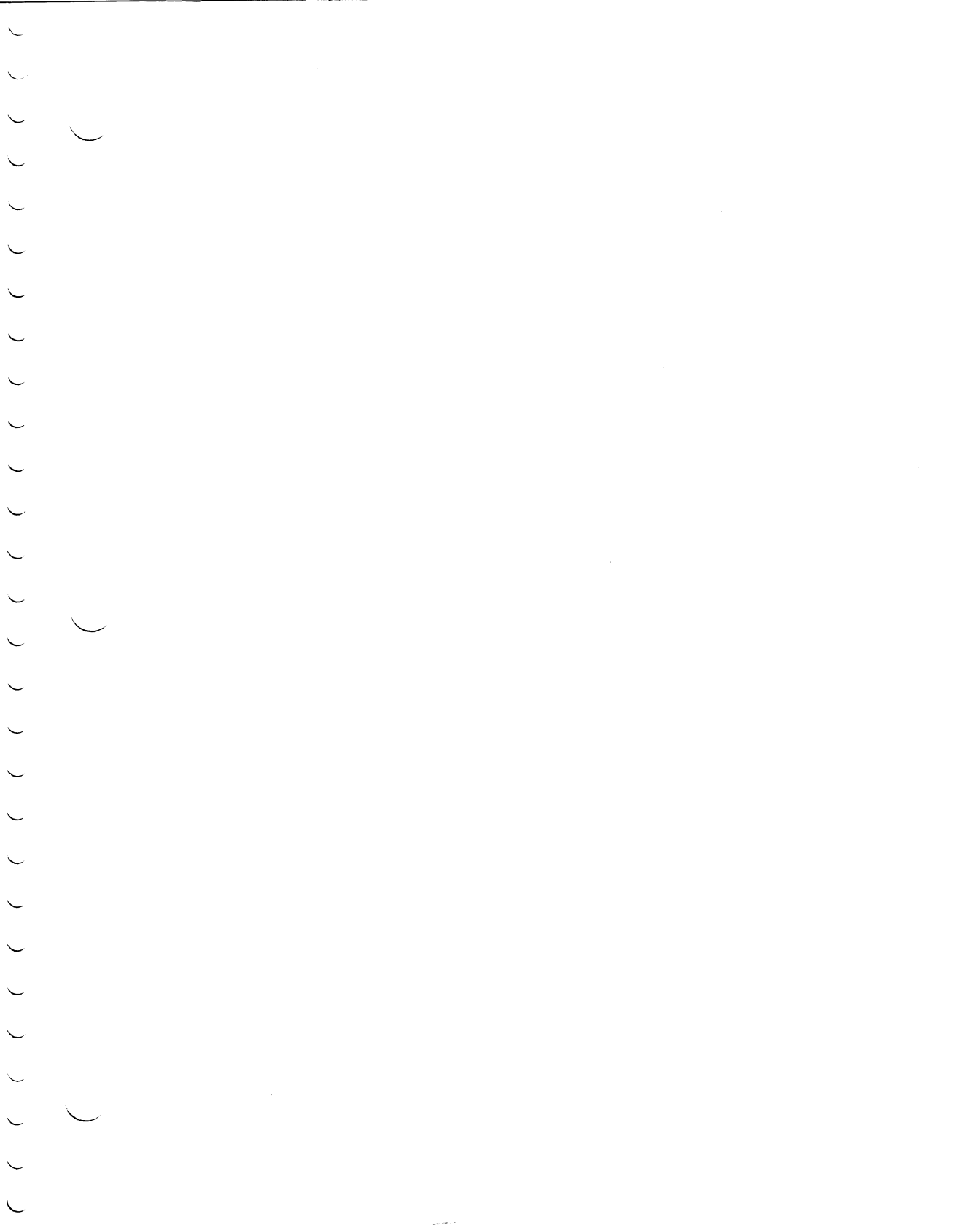


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